Contents

CS229 Image Preprocessing

Code by Connor Anderson

```
% Navigates to data folder and goes through images one by one, subtracting
% the flash images with the raw image to find the number of potential flash
% regions. The maximum region area, along with the number of regions are
% output into the text file: 'circleParams.txt' for use in primary learning
% algorithm.

close all;
clear all;

fileID = fopen('/Users/Connor/Box Sync/School/Graduate/CS229/Project/imagepreprocessing/Data/di

num_missing = 0;
num_processed = 0;
num_onlyOne = 0;


while true
    close all;
    tline = fgetl(fileID);
    if tline == -1
       break
    end
    pat = '\s+';
    n = regexp(tline, pat, 'split');
    space = ' ';
    base_filename = strcat(n(1),{space},n(2));
    filename_flash = strcat(n(1),{space},n(2),{space},'wflash.jpg');
    filename_noflash = strcat(n(1),{space},n(2),{space},'noflash.jpg');
    filename_flash = strrep(filename_flash{1},':','_');
    filename_noflash = strrep(filename_noflash{1},':','_');


    cd ~/Box' Sync'/School/Graduate/CS229/Project/imagepreprocessing/Data

    if exist(filename_flash, 'file') == 2 && exist(filename_noflash, 'file') == 2
```

```
        num_processed = num_processed + 1;
        I = imread(filename_flash);
%         figure, imshow(I,[])
        B = imread(filename_noflash);
%         figure, imshow(B,[])
```

```
        Ip = imsubtract(I,B);
%         figure, imshow(Ip,[])

        imwrite(Ip,'subtract.jpg')

        normI = im2double(I);
        normB = im2double(B);
        Ip_norm = imsubtract(I,B);
        Ip_norm = double(Ip_norm)./max(double(max(double(Ip_norm(:,:)))))*255;
        Ip_norm = uint8(round(Ip_norm));
%         figure, imshow(Ip_norm,[])
        imwrite(Ip_norm,'normsubtract.jpg')
```

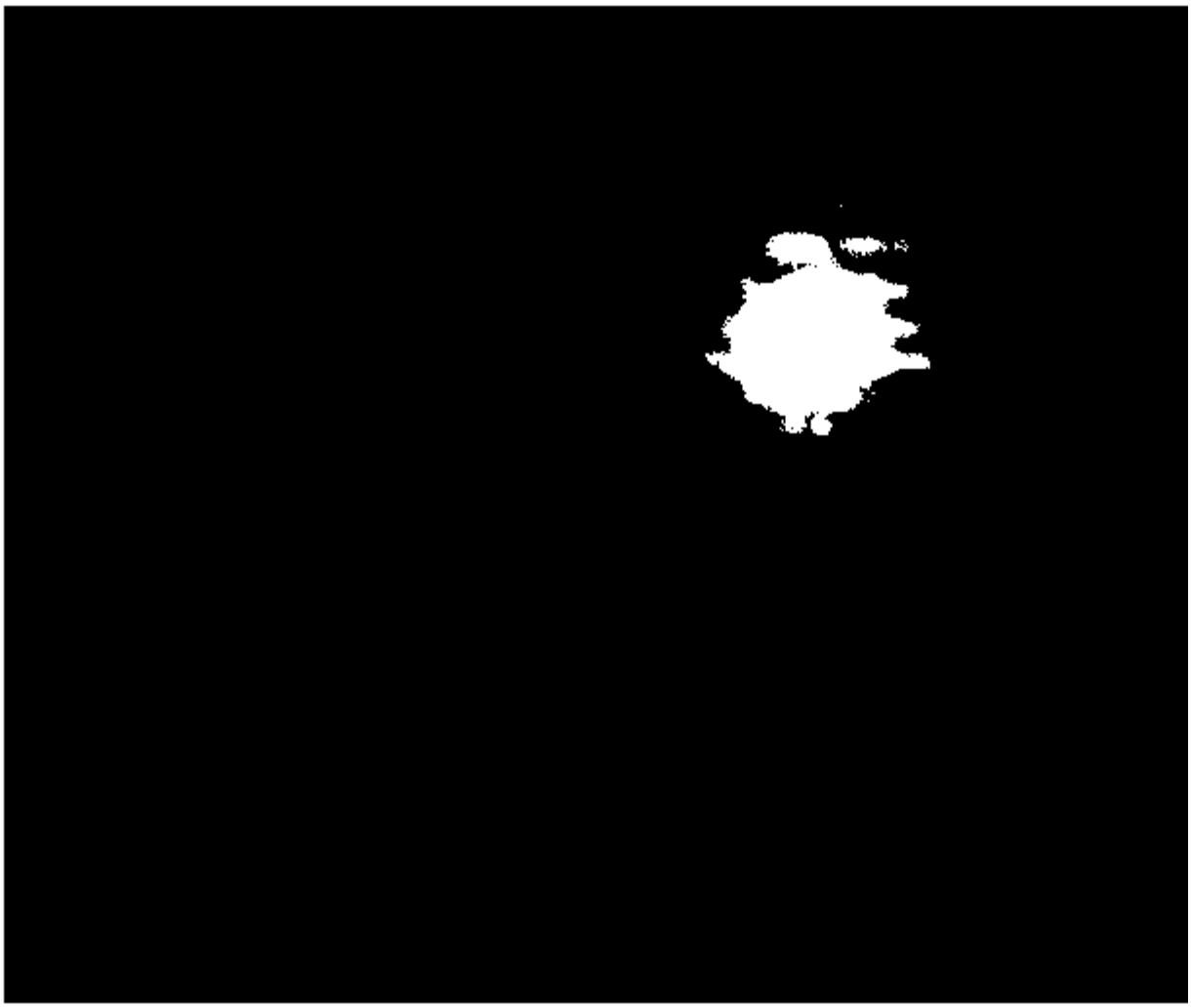
Threshold filter

```
        meanPixel = squeeze(mean(mean(Ip_norm)));
        thresh = mean(meanPixel);
        Ip_norm(Ip_norm<thresh) = 0;

        Ip_norm_grey = rgb2gray(Ip_norm);
%         figure, imshow(Ip_norm_grey)
%         figure, imhist(Ip_norm_grey)
        hist = imhist(Ip_norm_grey);
        levels = linspace(0,1,length(hist));
        [approx_mean mean_index] = max(hist);

        % level = levels(mean_index) + 0.3;
        level = 0.6;
        fThresh = im2bw(Ip_norm_grey, level) ;
        figure, imshow(fThresh)
%         imwrite(fThresh,'topHat_grey.jpg')

%         [B,L,N,A] = bwboundaries(fThresh,'noholes');
%         figure, imshow(fThresh); hold on;
%         colors=['b' 'g' 'r' 'c' 'm' 'y'];
%         for k=1:length(B),
%           boundary = B{k};
%           cidx = mod(k,length(colors))+1;
%           plot(boundary(:,2), boundary(:,1),...
%                colors(cidx),'LineWidth',2);
%
%           %randomize text position for better visibility
%           rndRow = ceil(length(boundary)/(mod(rand*k,7)+1));
%           col = boundary(rndRow,2); row = boundary(rndRow,1);
%           h = text(col+1, row-1, num2str(L(row,col)));
%           set(h,'Color',colors(cidx),'FontSize',14,'FontWeight','bold');
%         end

        measurements = regionprops(fThresh, 'Area');
        allAreas = [measurements.Area];

        cd ~/Box' Sync'/School/Graduate/CS229/Project/imagepreprocessing
```

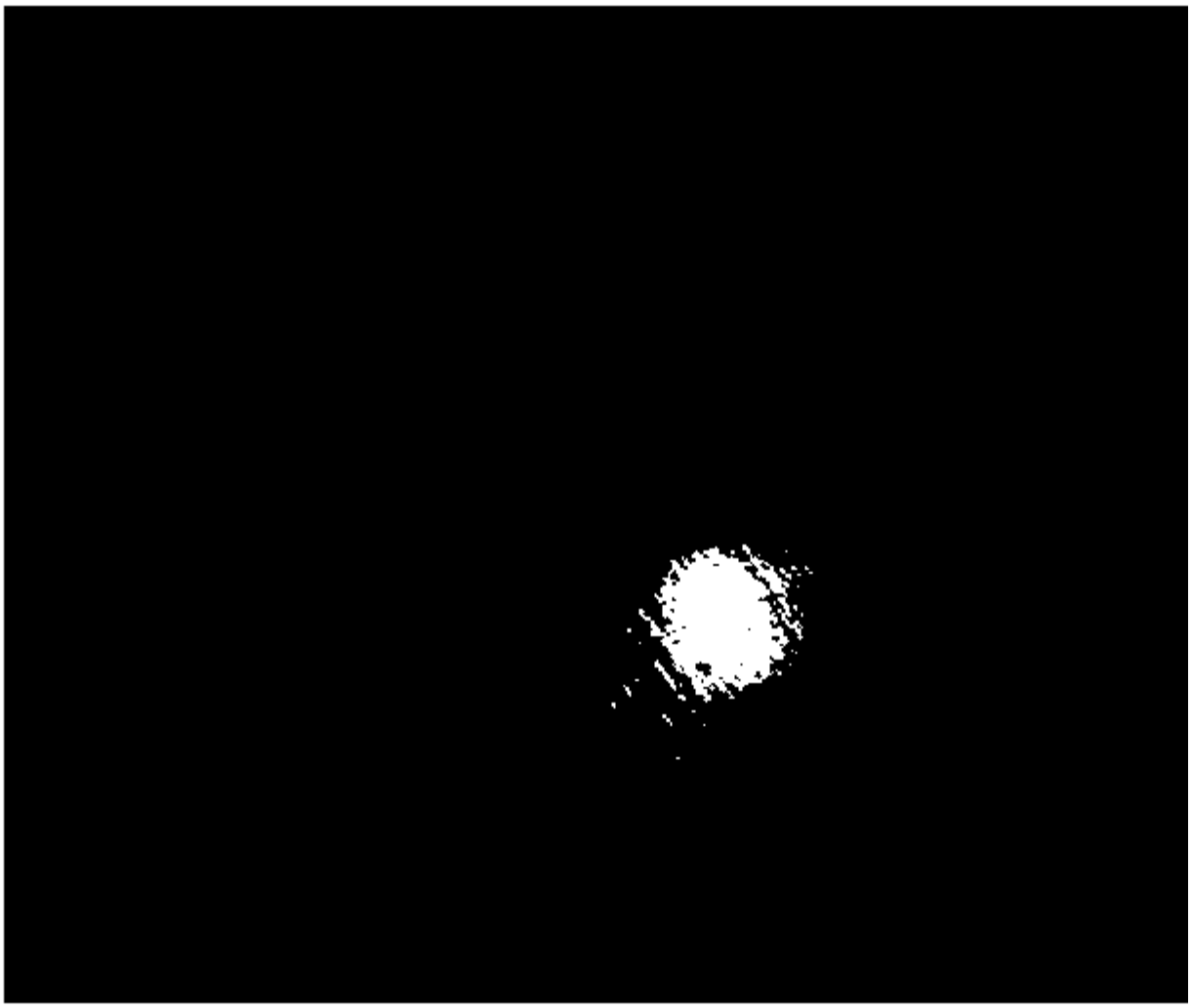
Warning: Image is too big to fit on screen; displaying at 67%

Warning: Image is too big to fit on screen; displaying at 67%

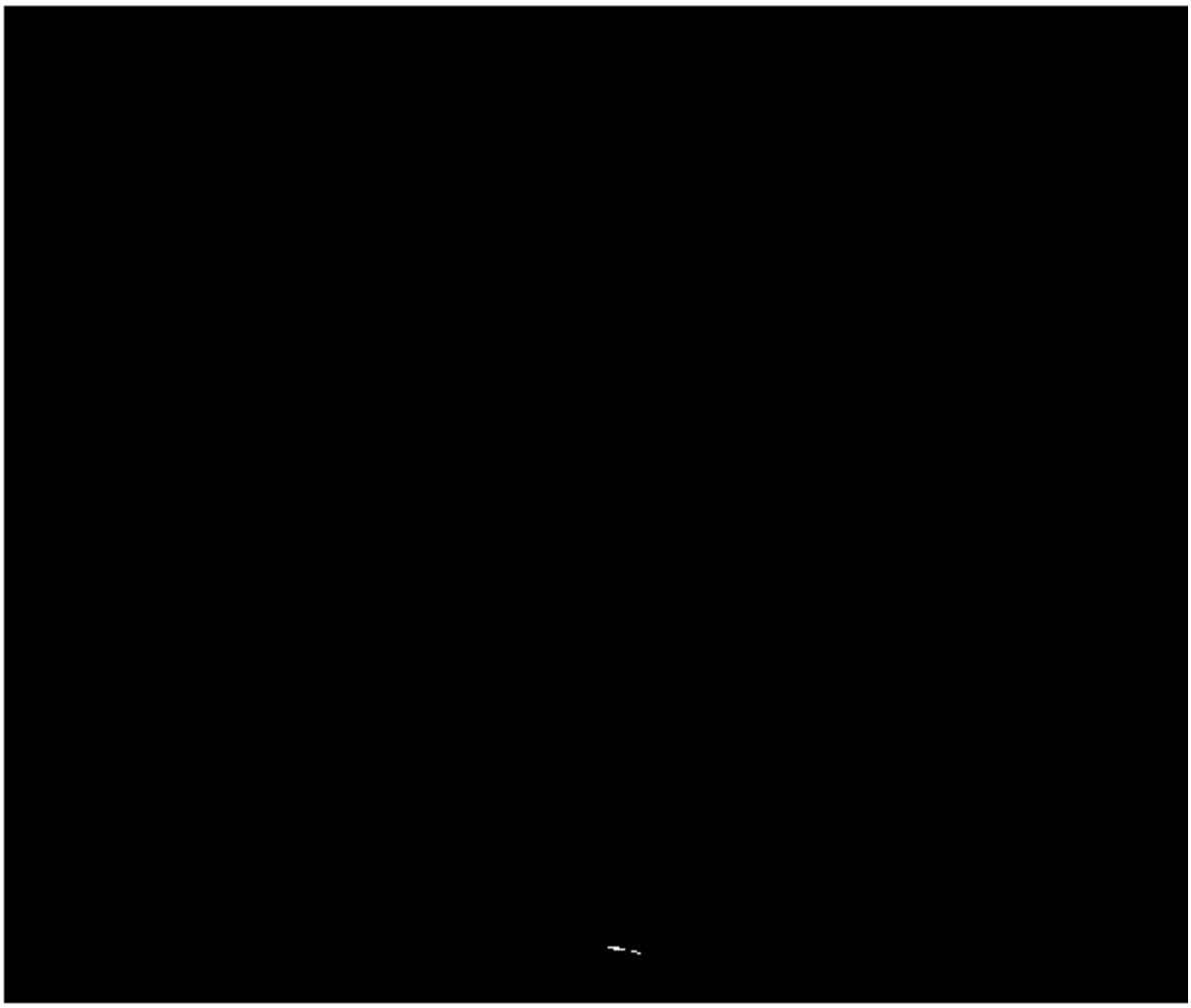
Warning: Image is too big to fit on screen; displaying at 67%



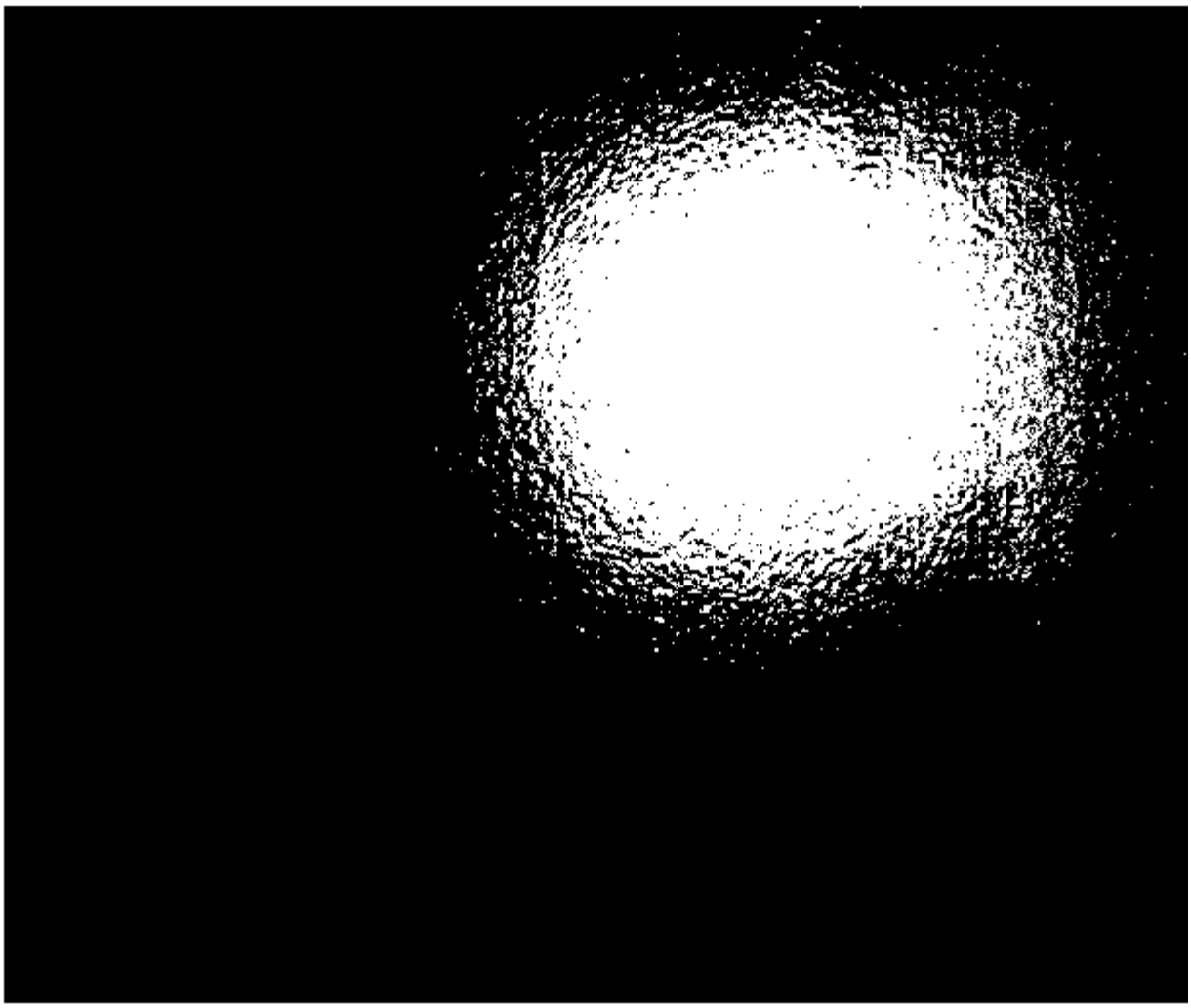
Warning: Image is too big to fit on screen; displaying at 67%



Warning: Image is too big to fit on screen; displaying at 67%



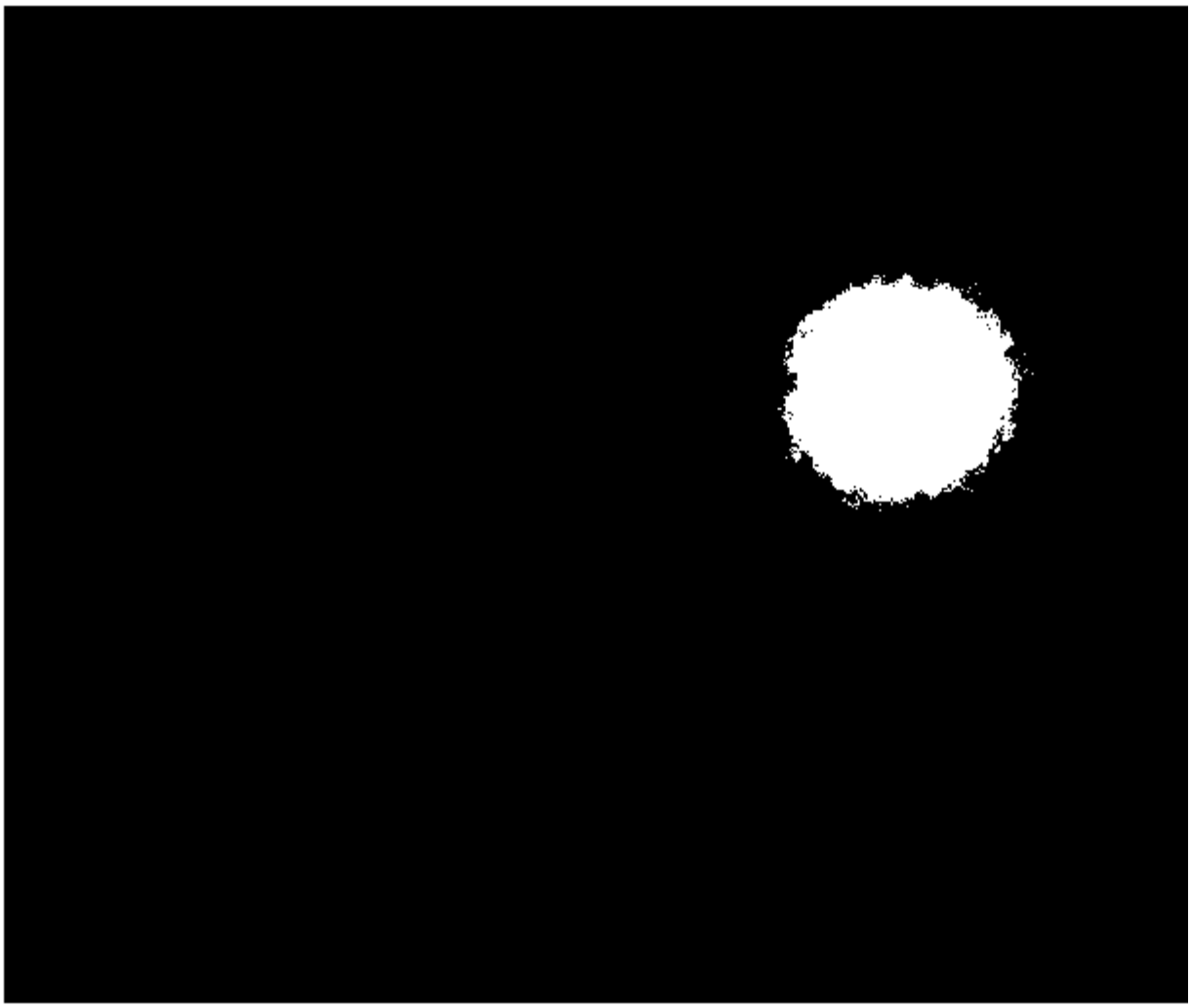
Warning: Image is too big to fit on screen; displaying at 67%



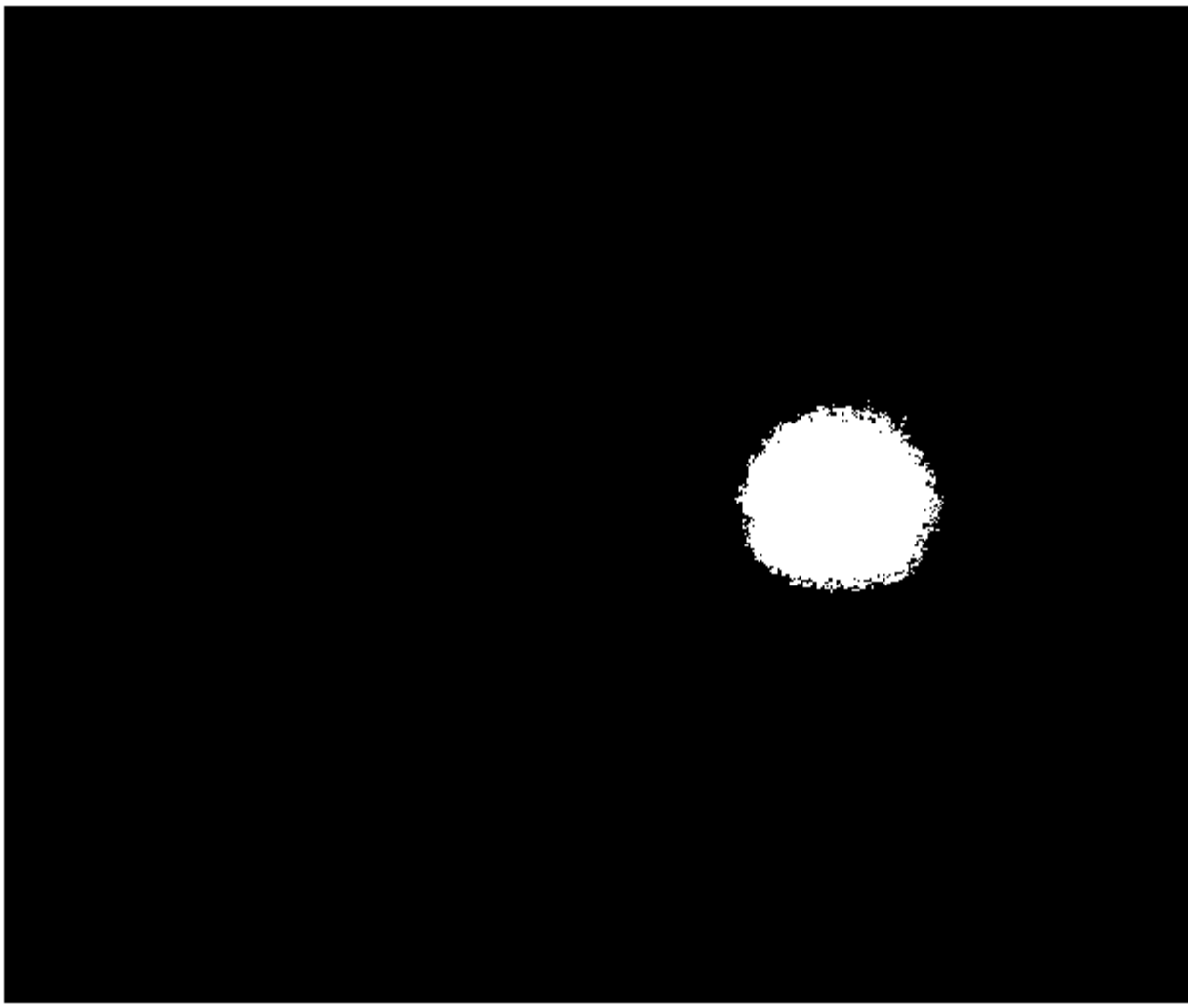
Warning: Image is too big to fit on screen; displaying at 67%

Warning: Image is too big to fit on screen; displaying at 67%

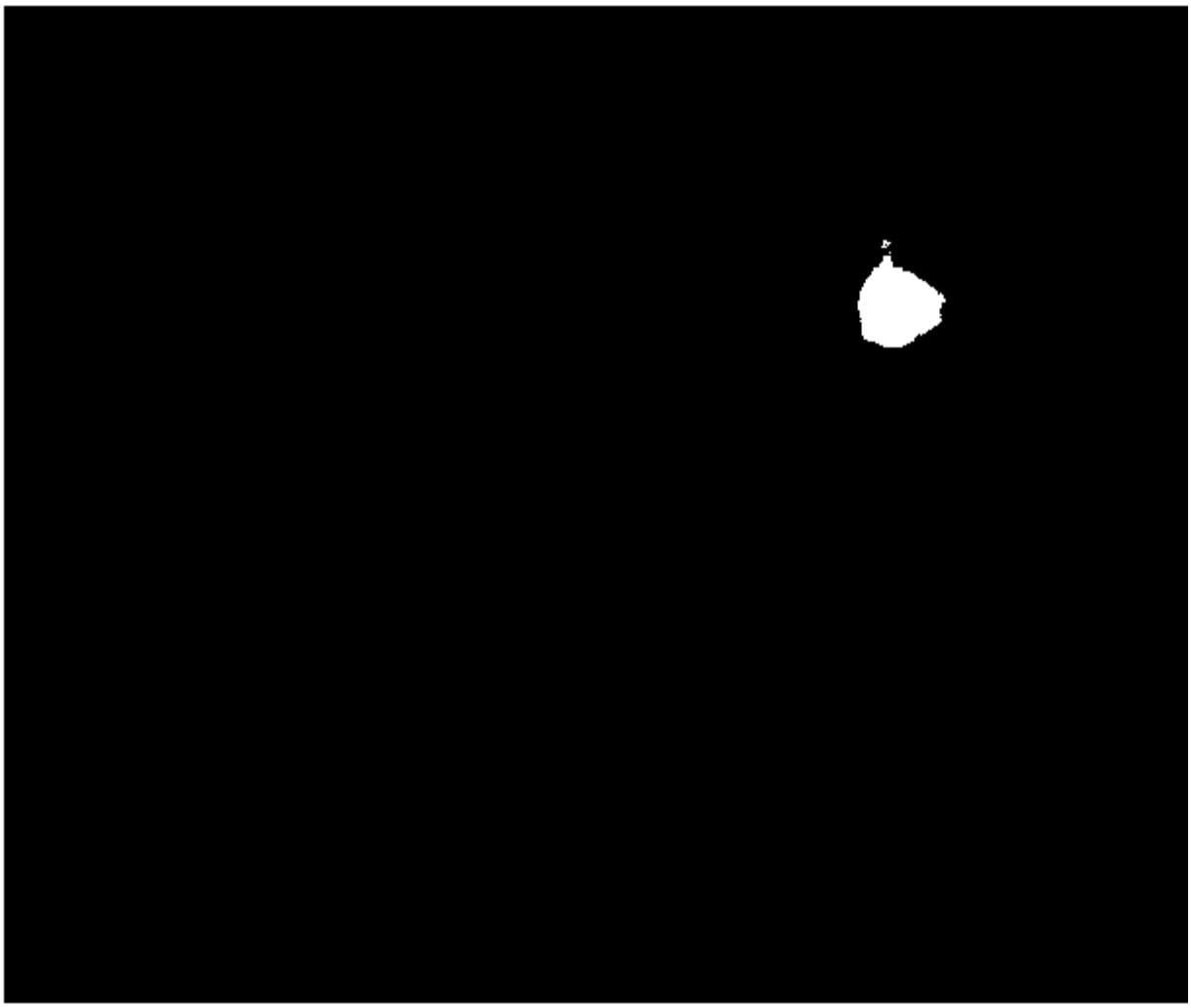
Warning: Image is too big to fit on screen; displaying at 67%



Warning: Image is too big to fit on screen; displaying at 67%

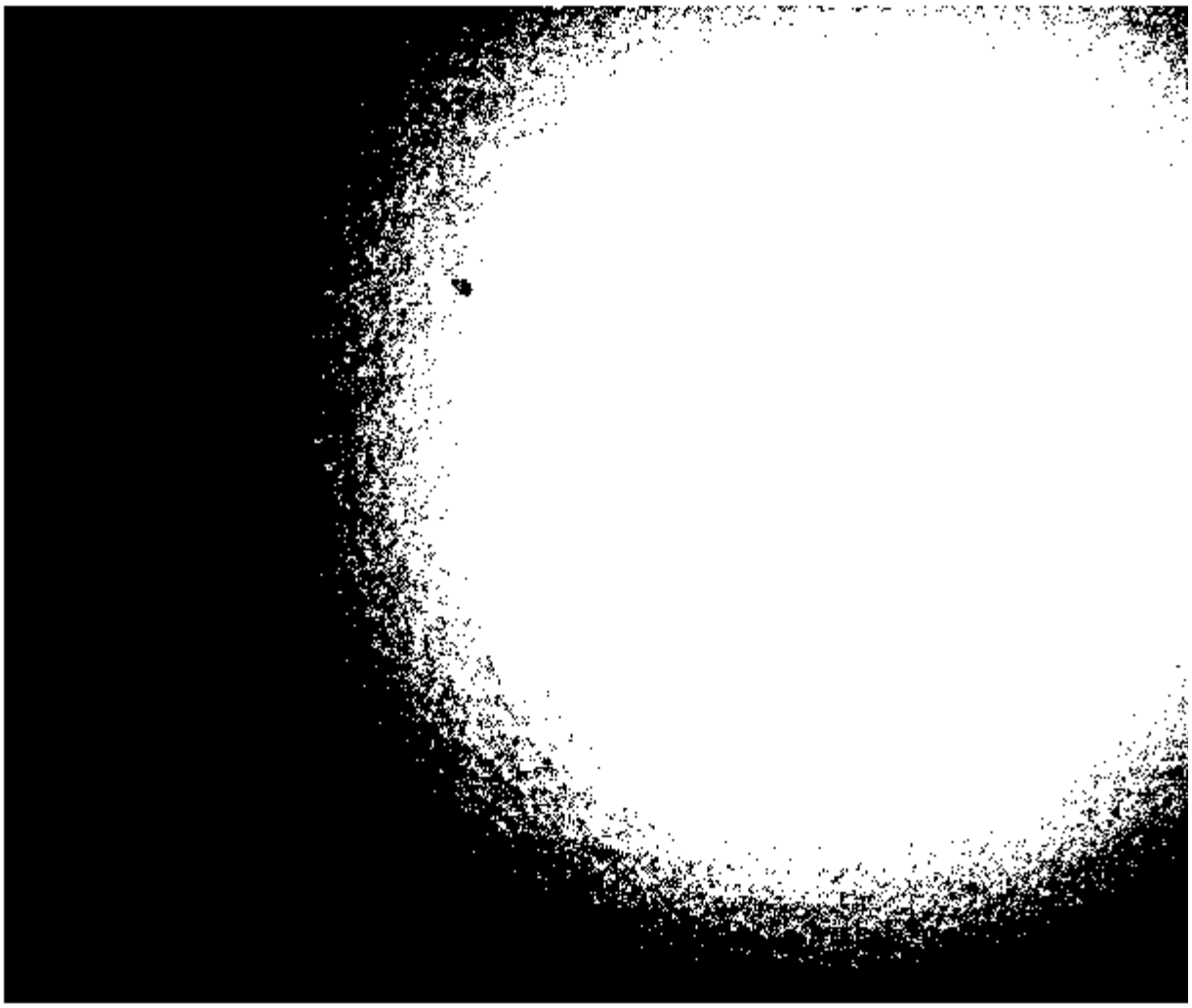


Warning: Image is too big to fit on screen; displaying at 67%



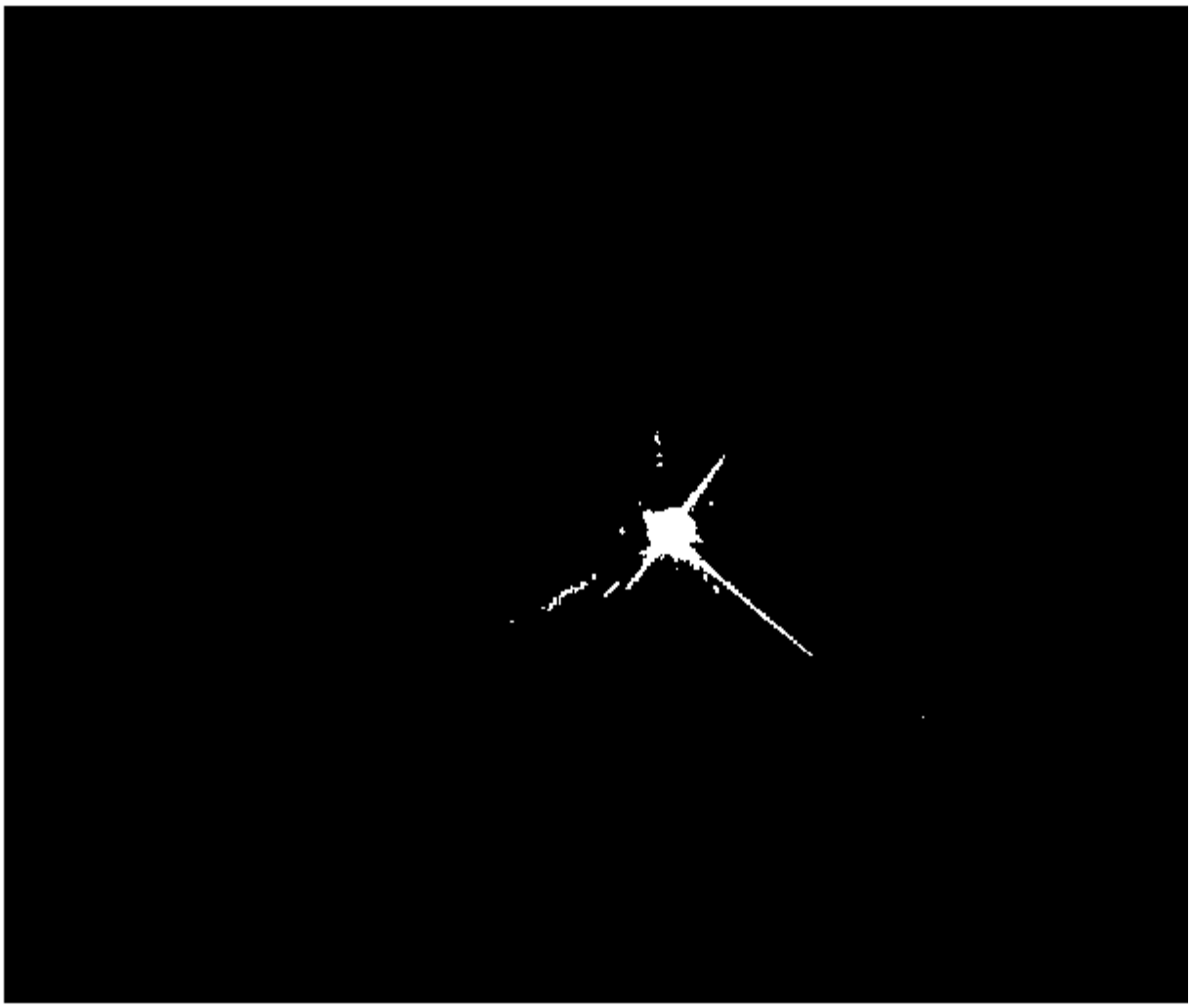
Warning: Image is too big to fit on screen; displaying at 67%

Warning: Image is too big to fit on screen; displaying at 67%

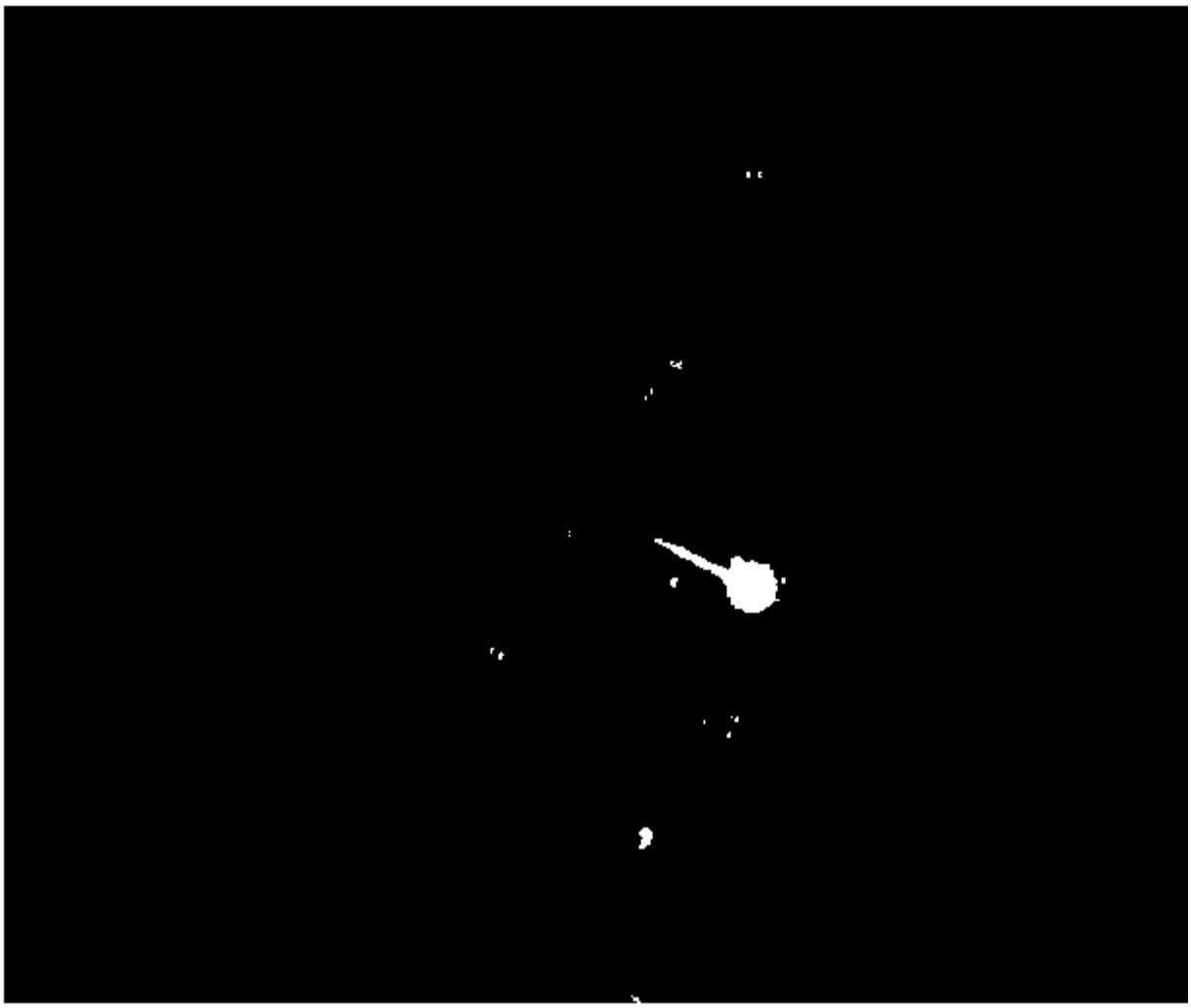


Warning: Image is too big to fit on screen; displaying at 67%

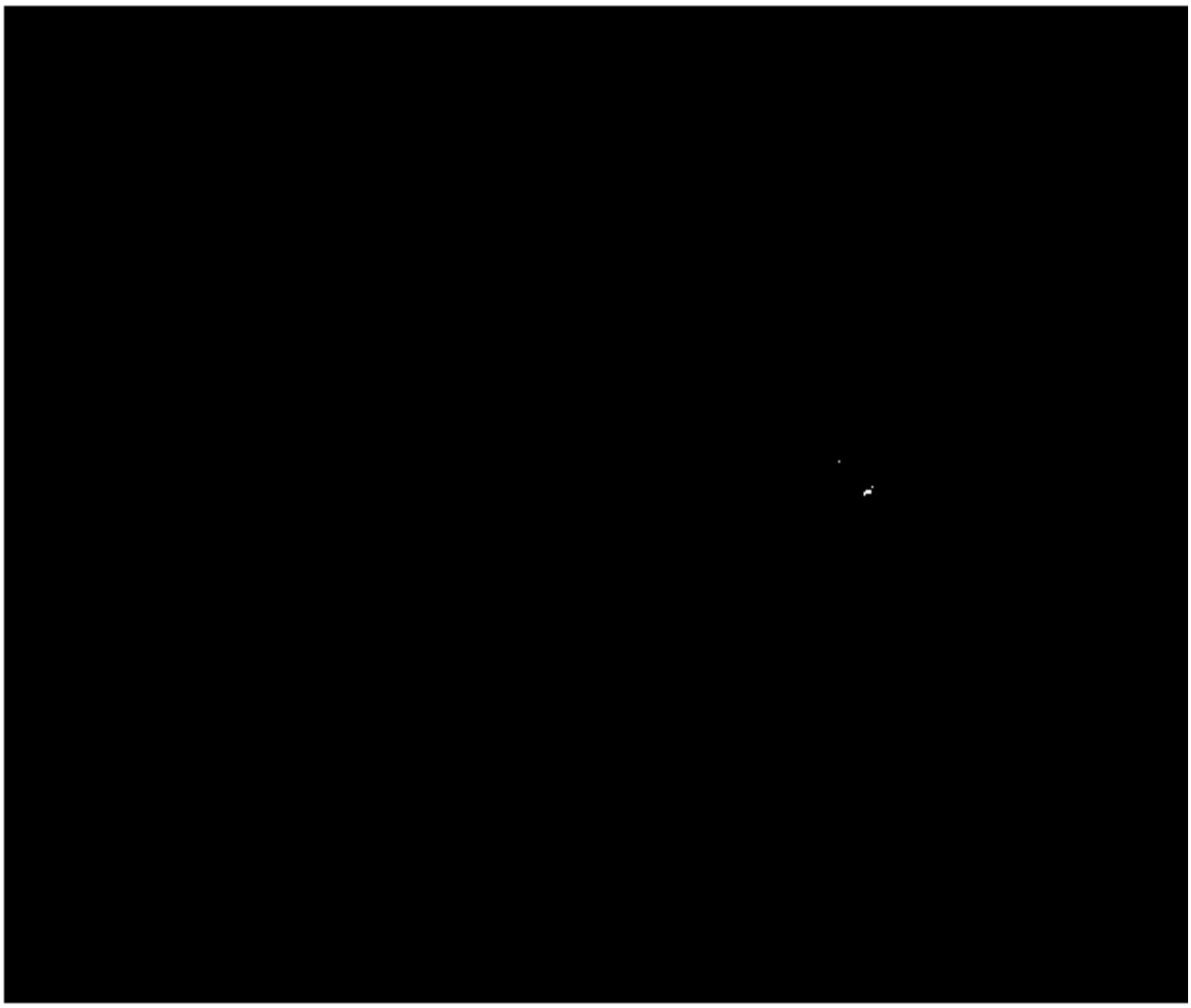
Warning: Image is too big to fit on screen; displaying at 67%



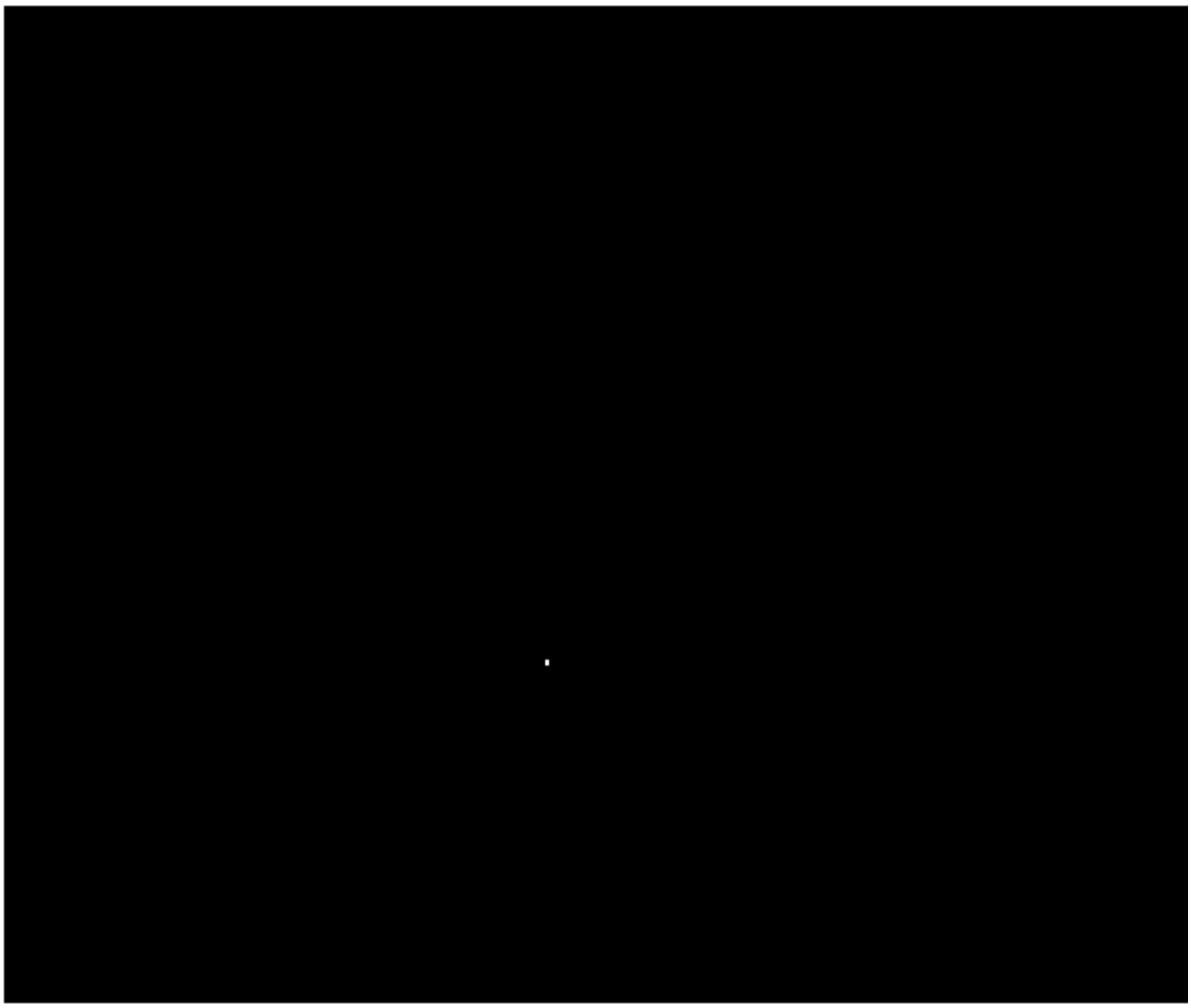
Warning: Image is too big to fit on screen; displaying at 67%



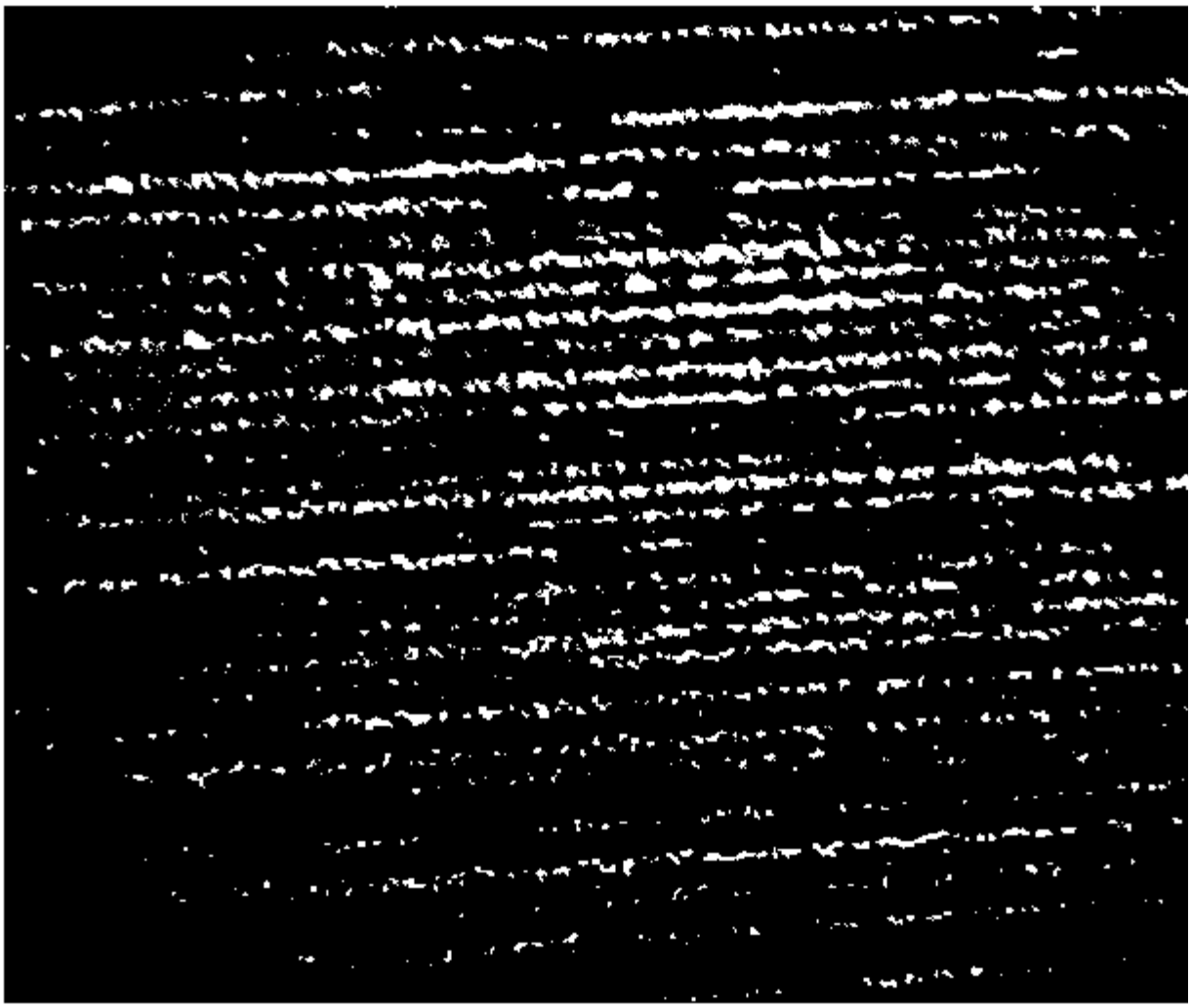
Warning: Image is too big to fit on screen; displaying at 67%



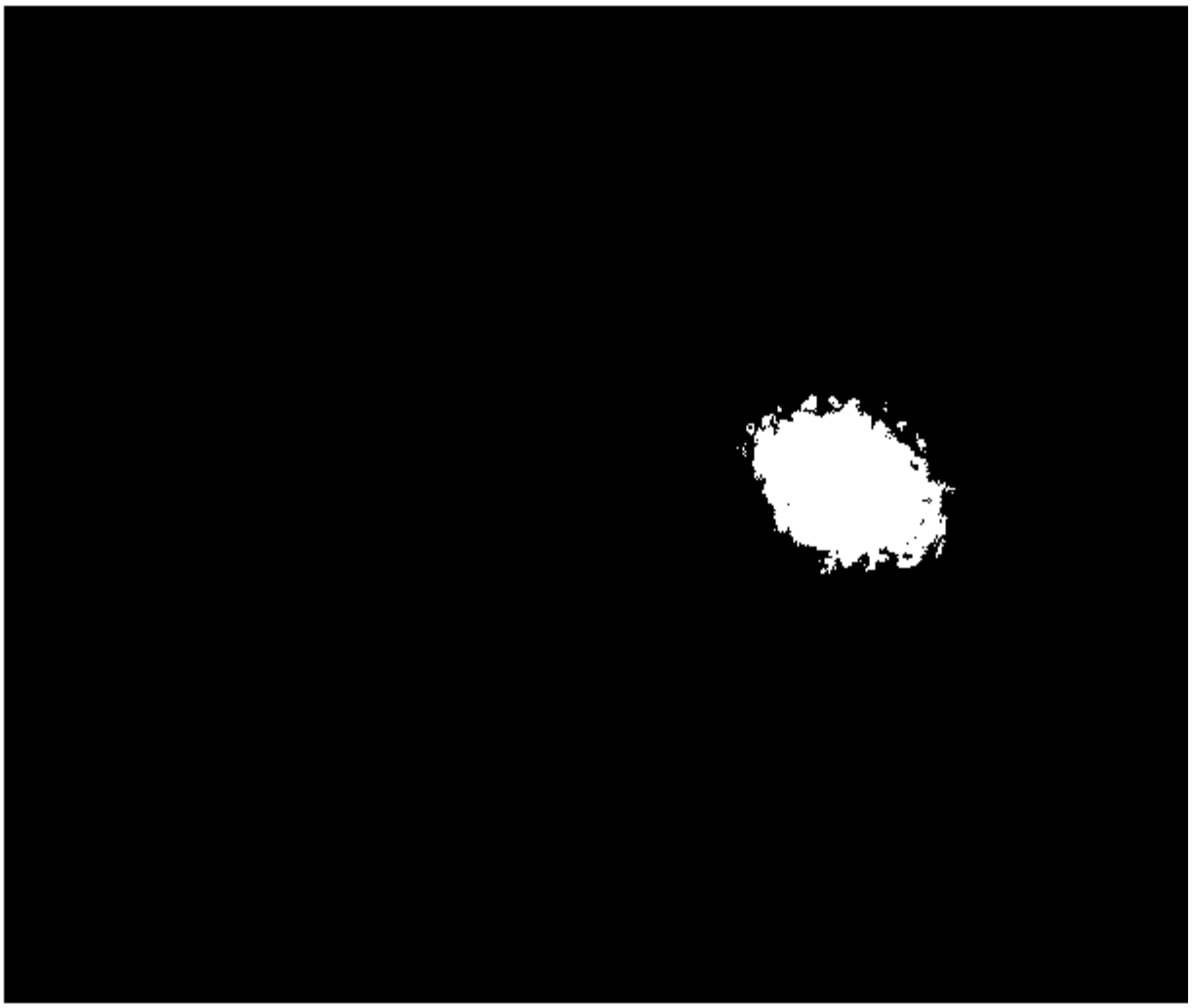
Warning: Image is too big to fit on screen; displaying at 67%



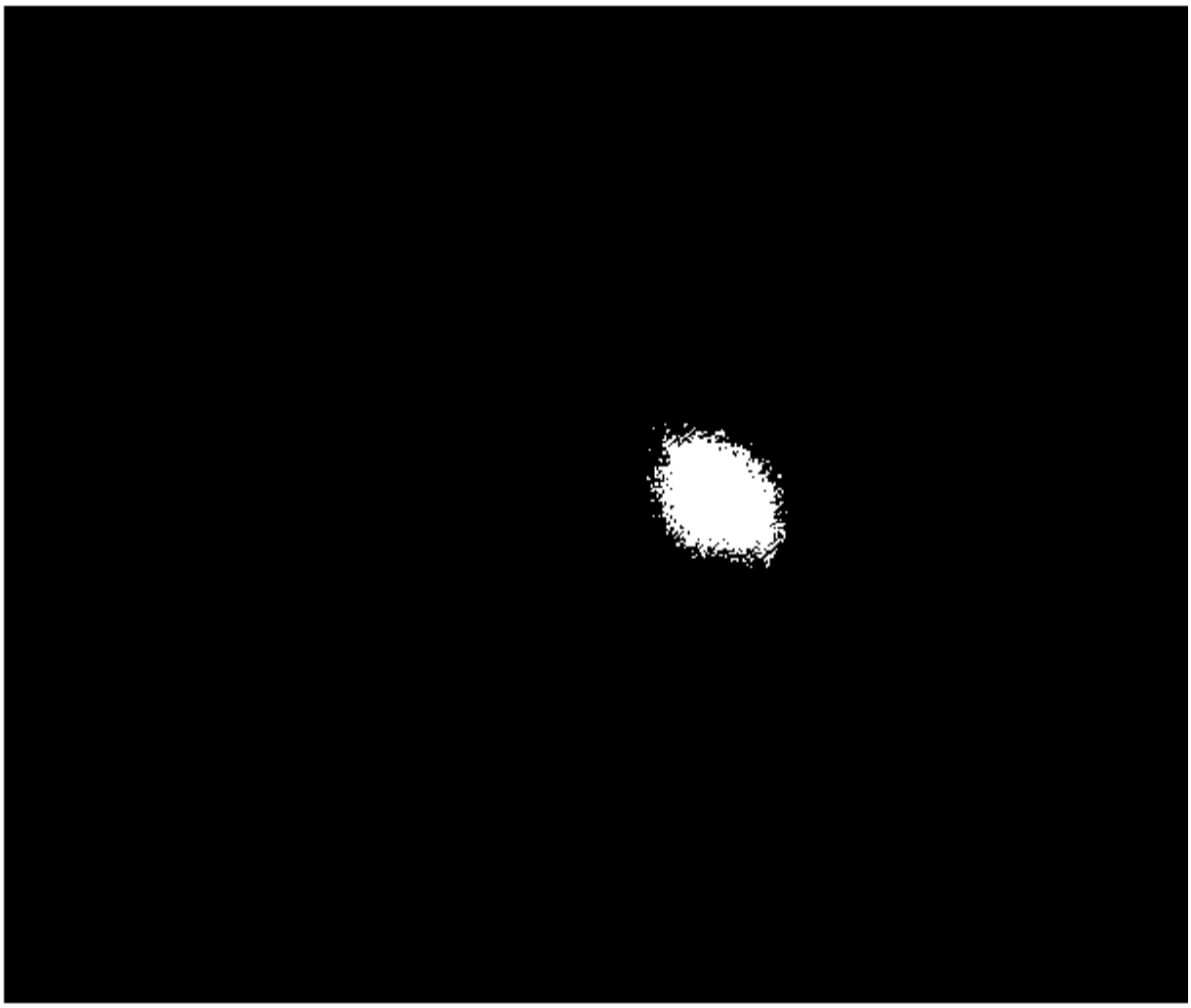
Warning: Image is too big to fit on screen; displaying at 67%



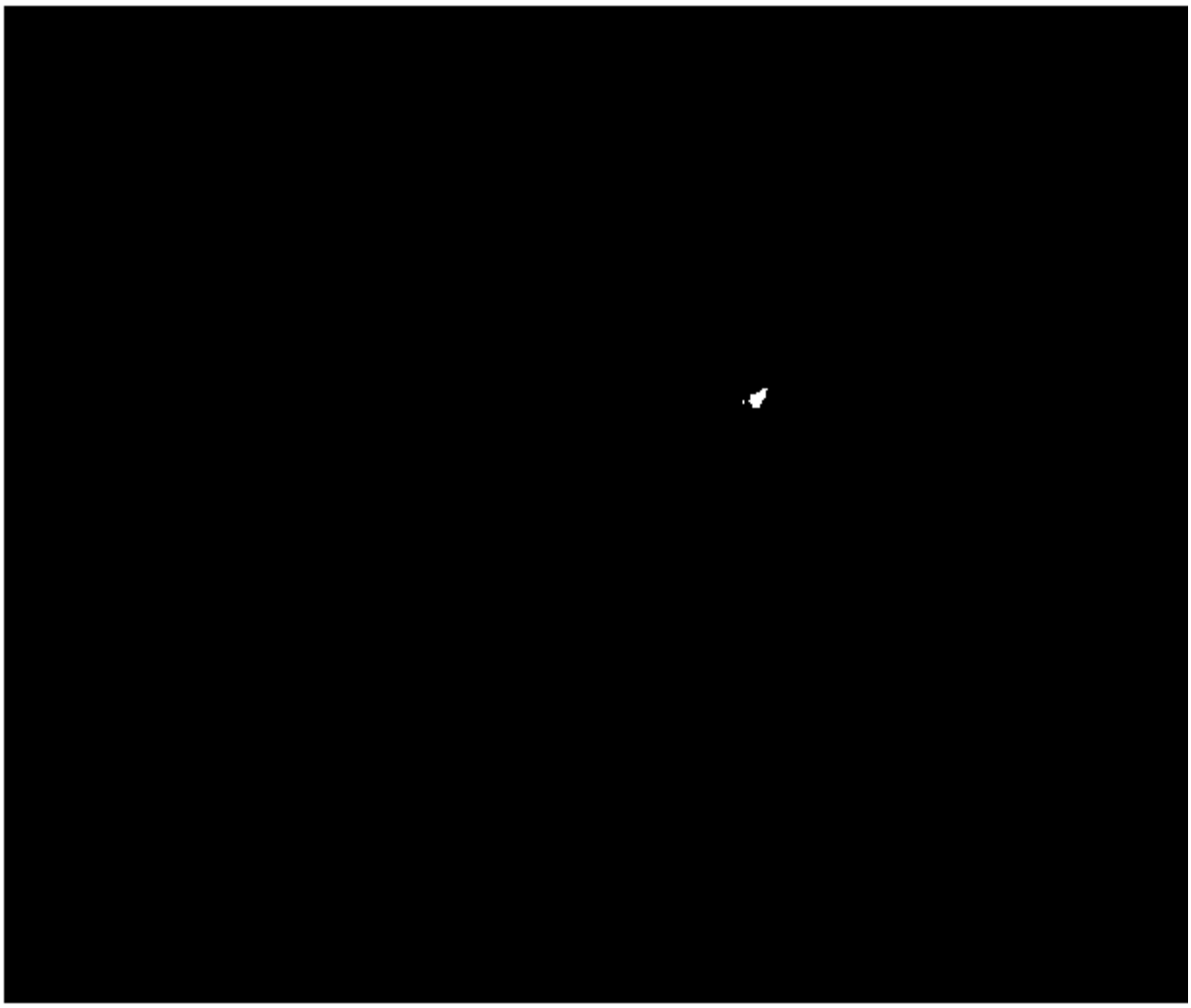
Warning: Image is too big to fit on screen; displaying at 67%



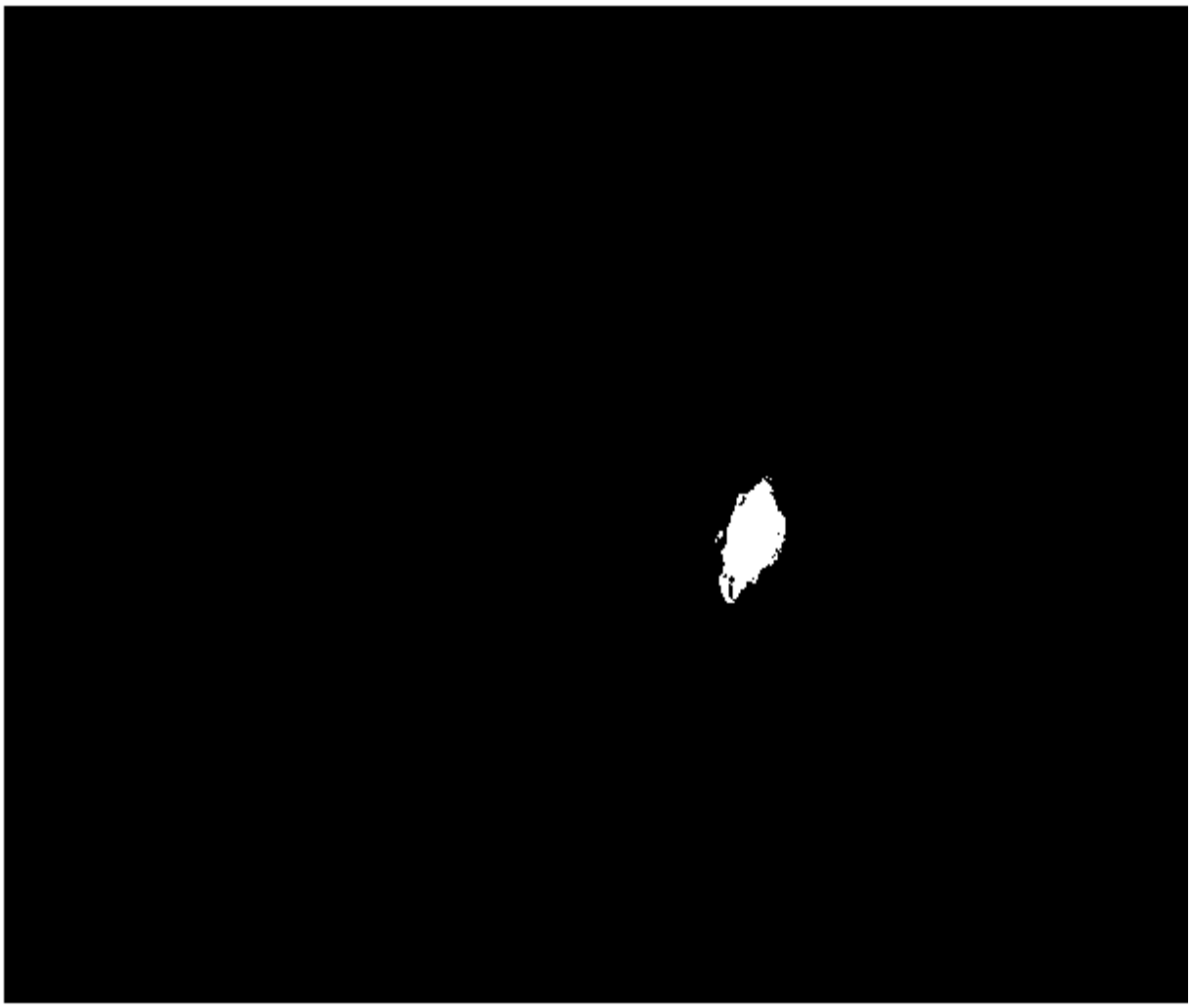
Warning: Image is too big to fit on screen; displaying at 67%



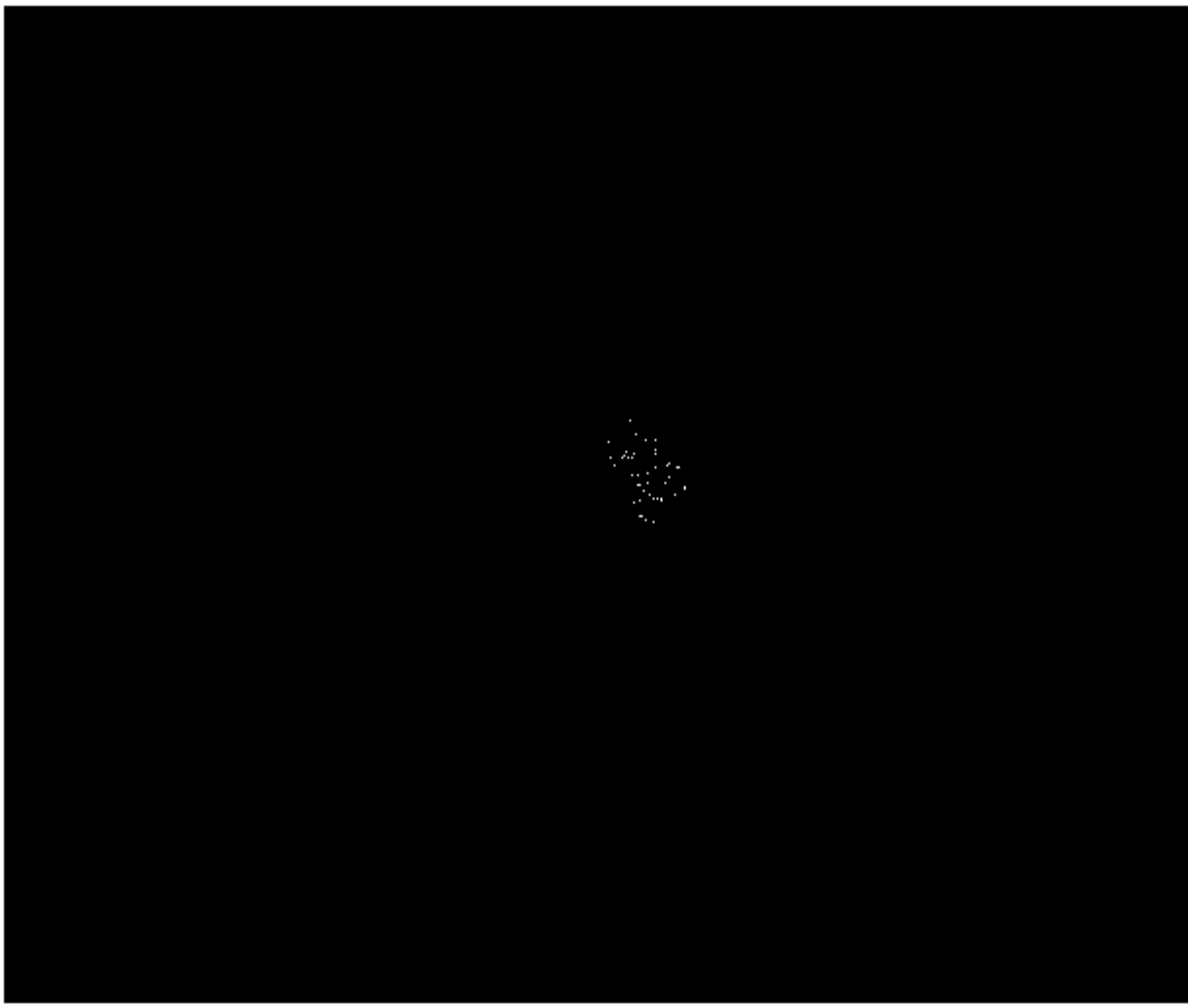
Warning: Image is too big to fit on screen; displaying at 67%



Warning: Image is too big to fit on screen; displaying at 67%



Warning: Image is too big to fit on screen; displaying at 67%



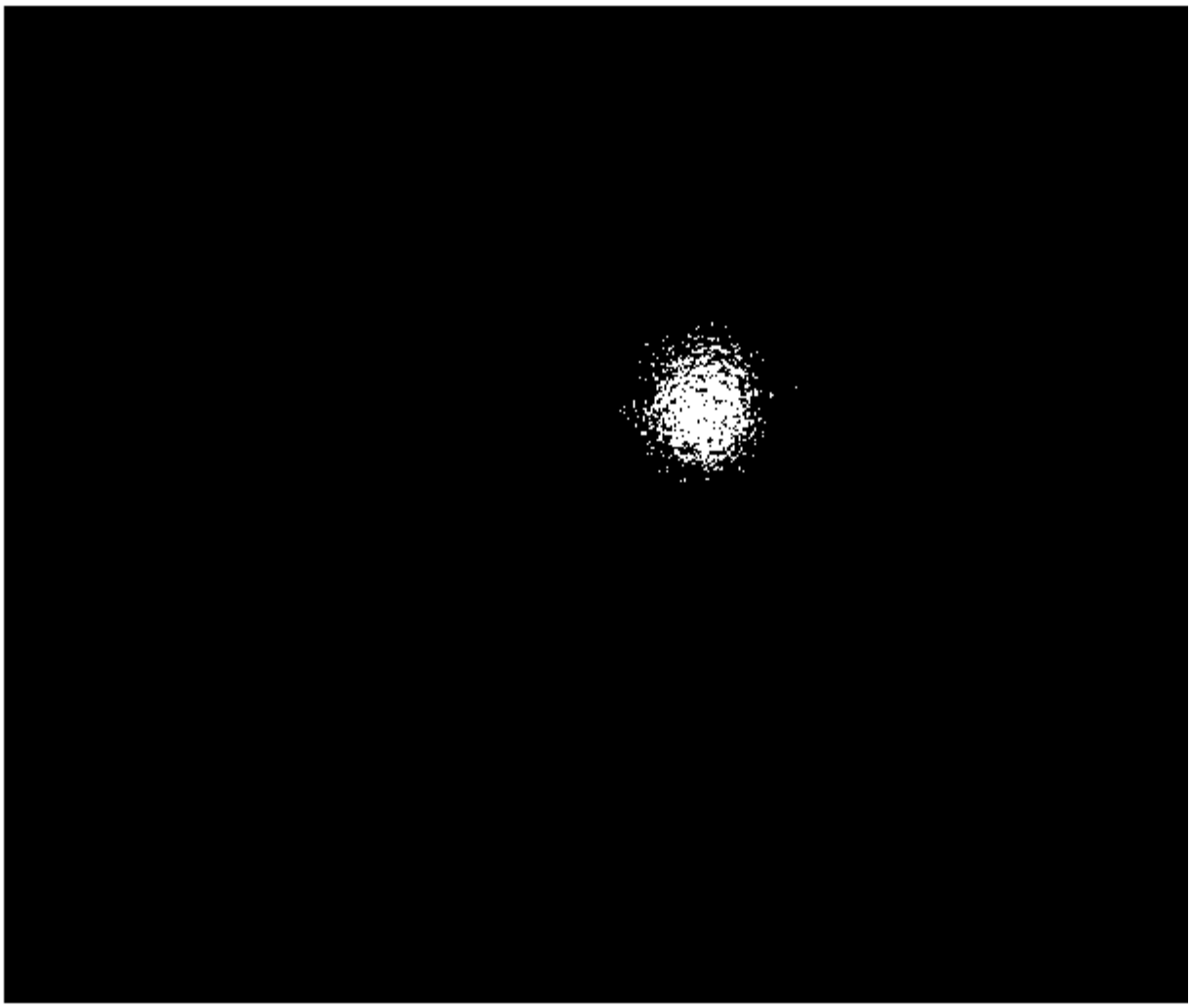
Warning: Image is too big to fit on screen; displaying at 67%

Warning: Image is too big to fit on screen; displaying at 67%

Warning: Image is too big to fit on screen; displaying at 67%

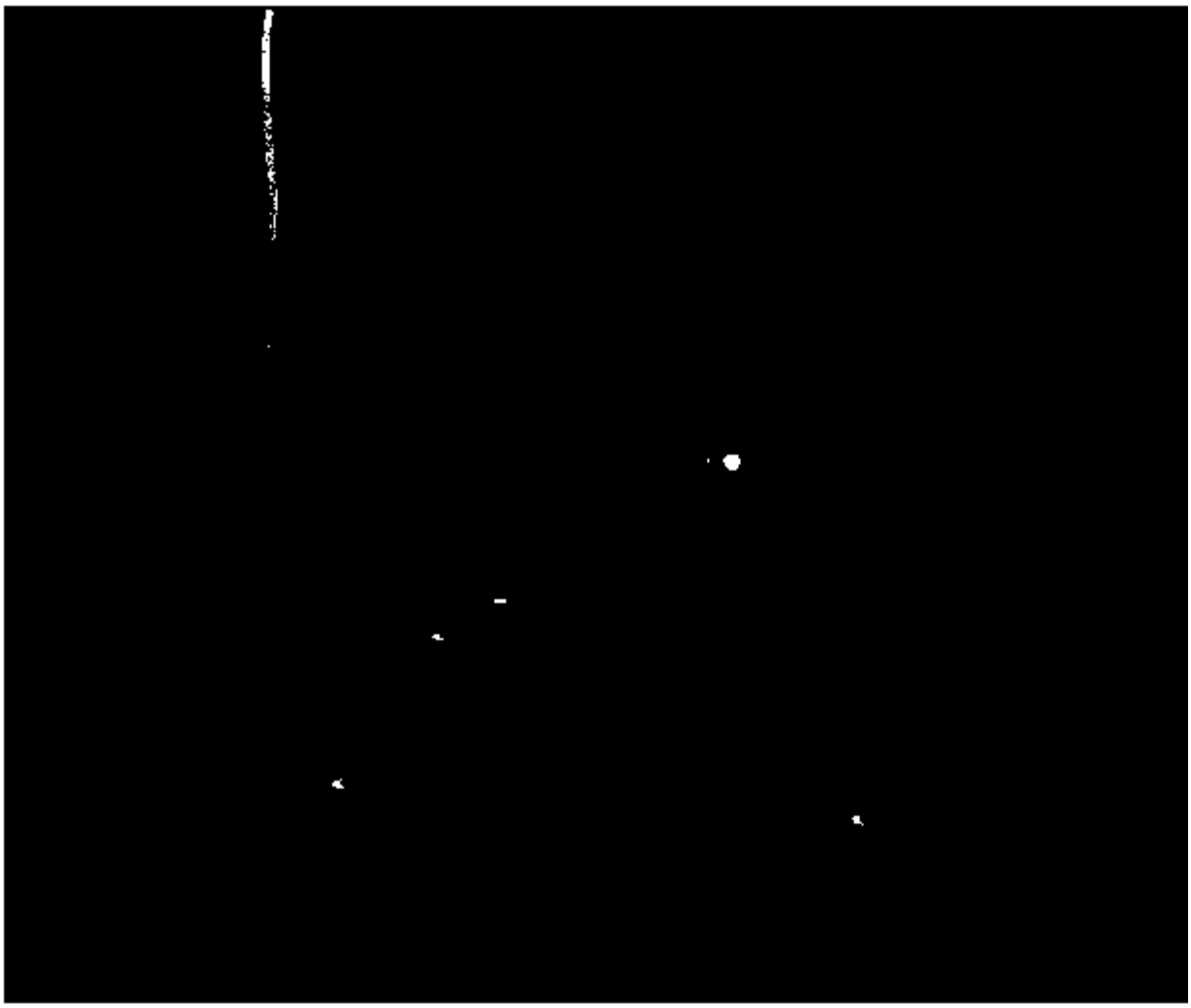
Warning: Image is too big to fit on screen; displaying at 67%

Warning: Image is too big to fit on screen; displaying at 67%

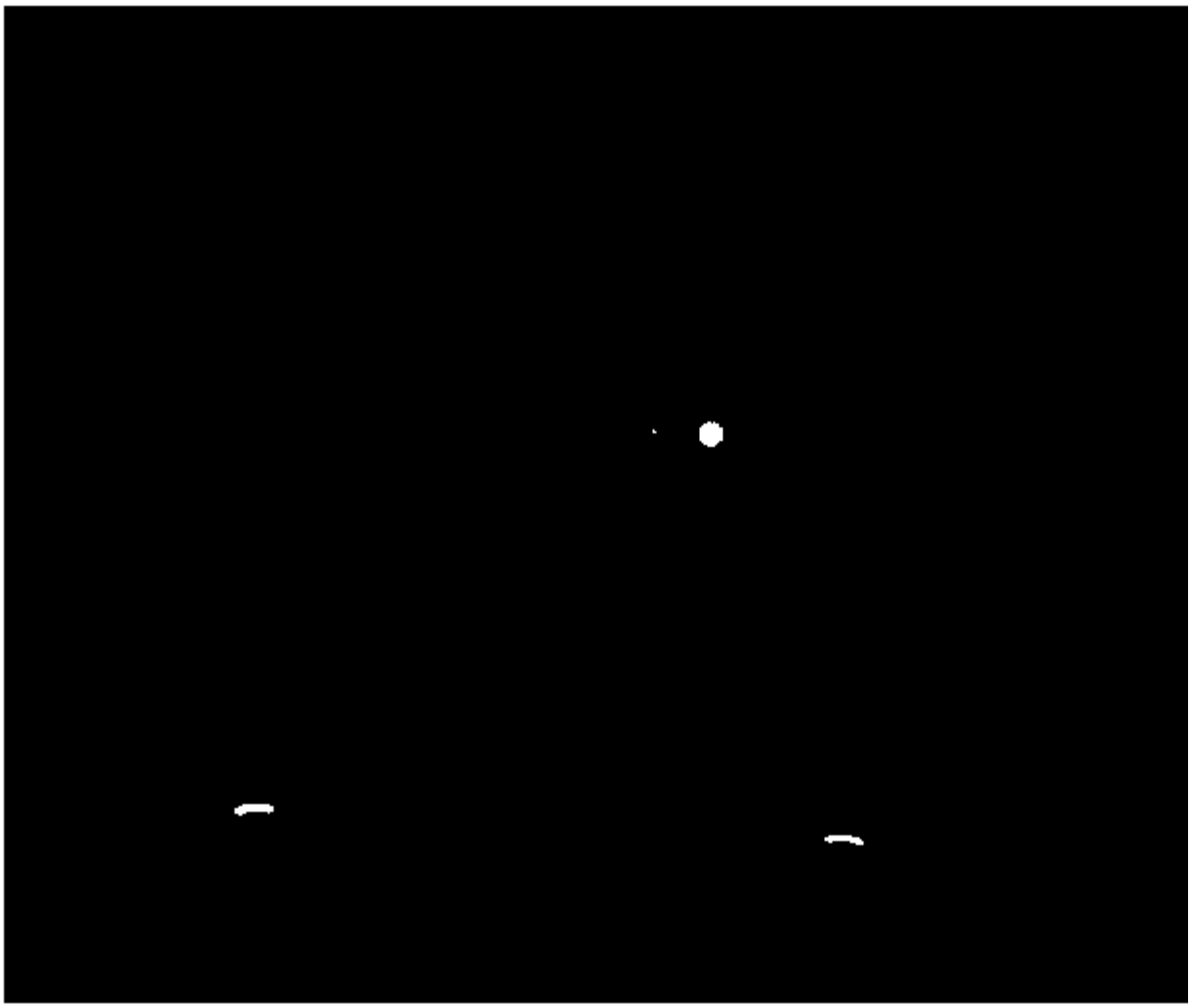


Warning: Image is too big to fit on screen; displaying at 67%

Warning: Image is too big to fit on screen; displaying at 67%

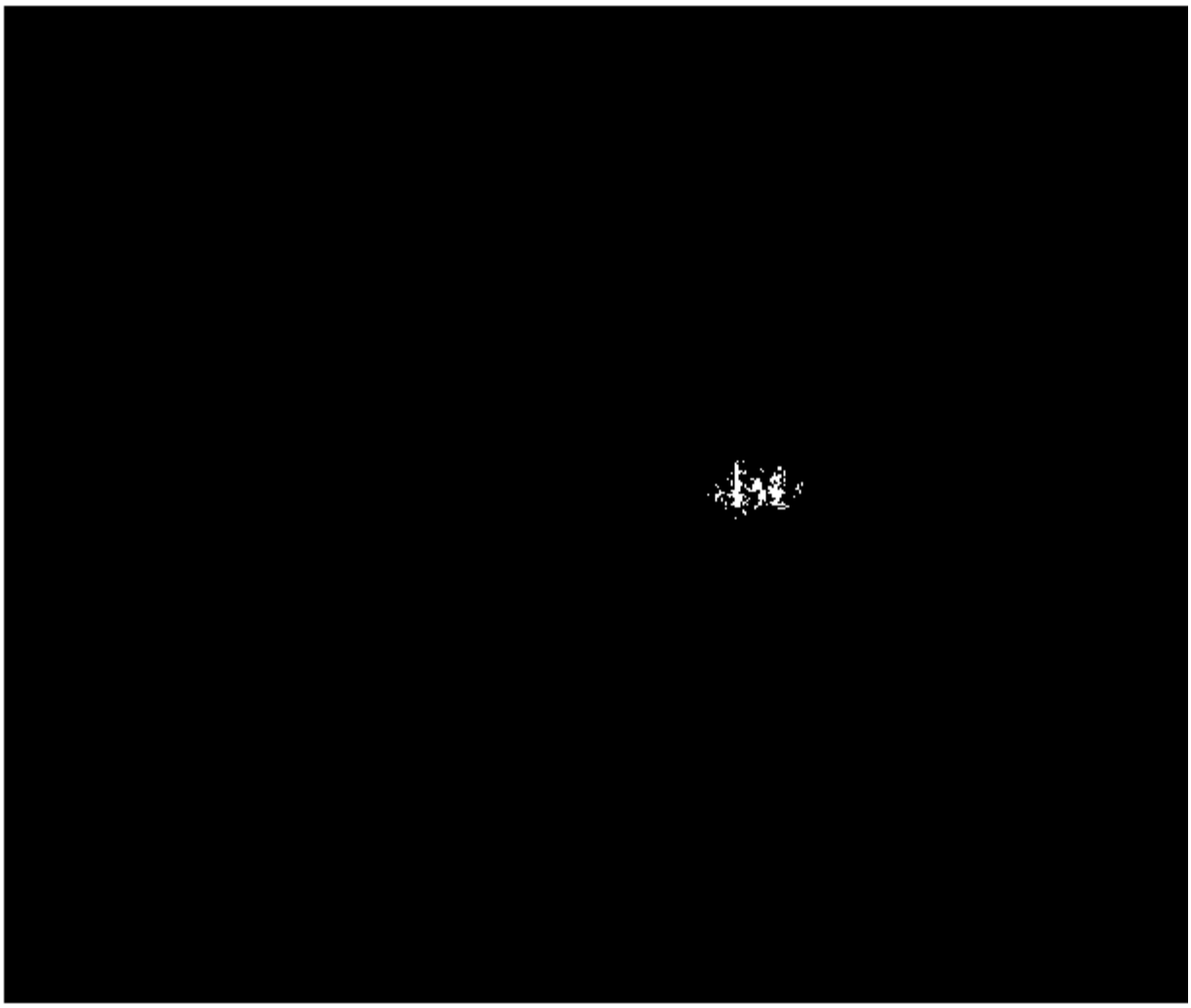


Warning: Image is too big to fit on screen; displaying at 67%



Warning: Image is too big to fit on screen; displaying at 67%

Warning: Image is too big to fit on screen; displaying at 67%



Warning: Image is too big to fit on screen; displaying at 67%

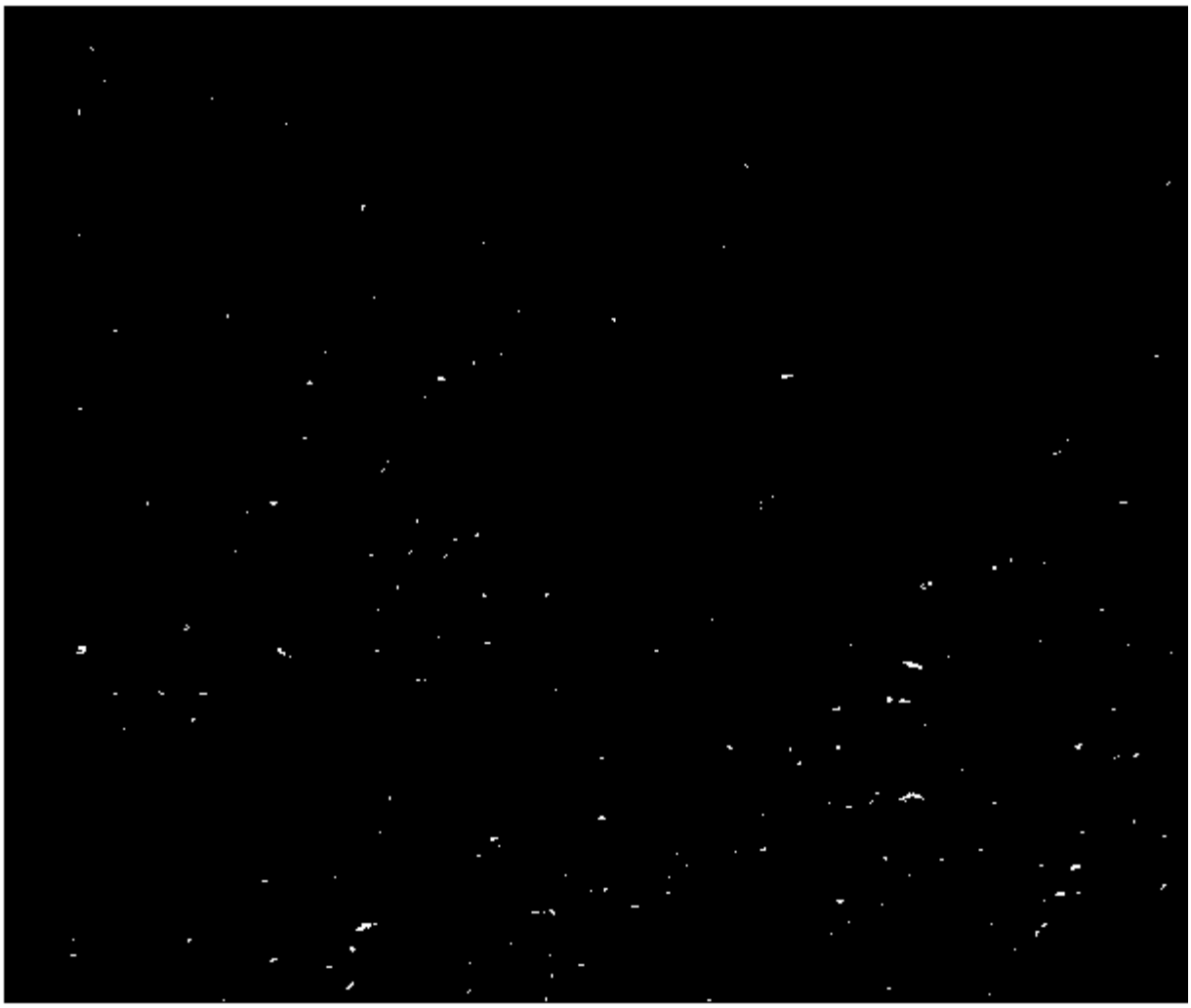
Warning: Image is too big to fit on screen; displaying at 67%

Warning: Image is too big to fit on screen; displaying at 67%

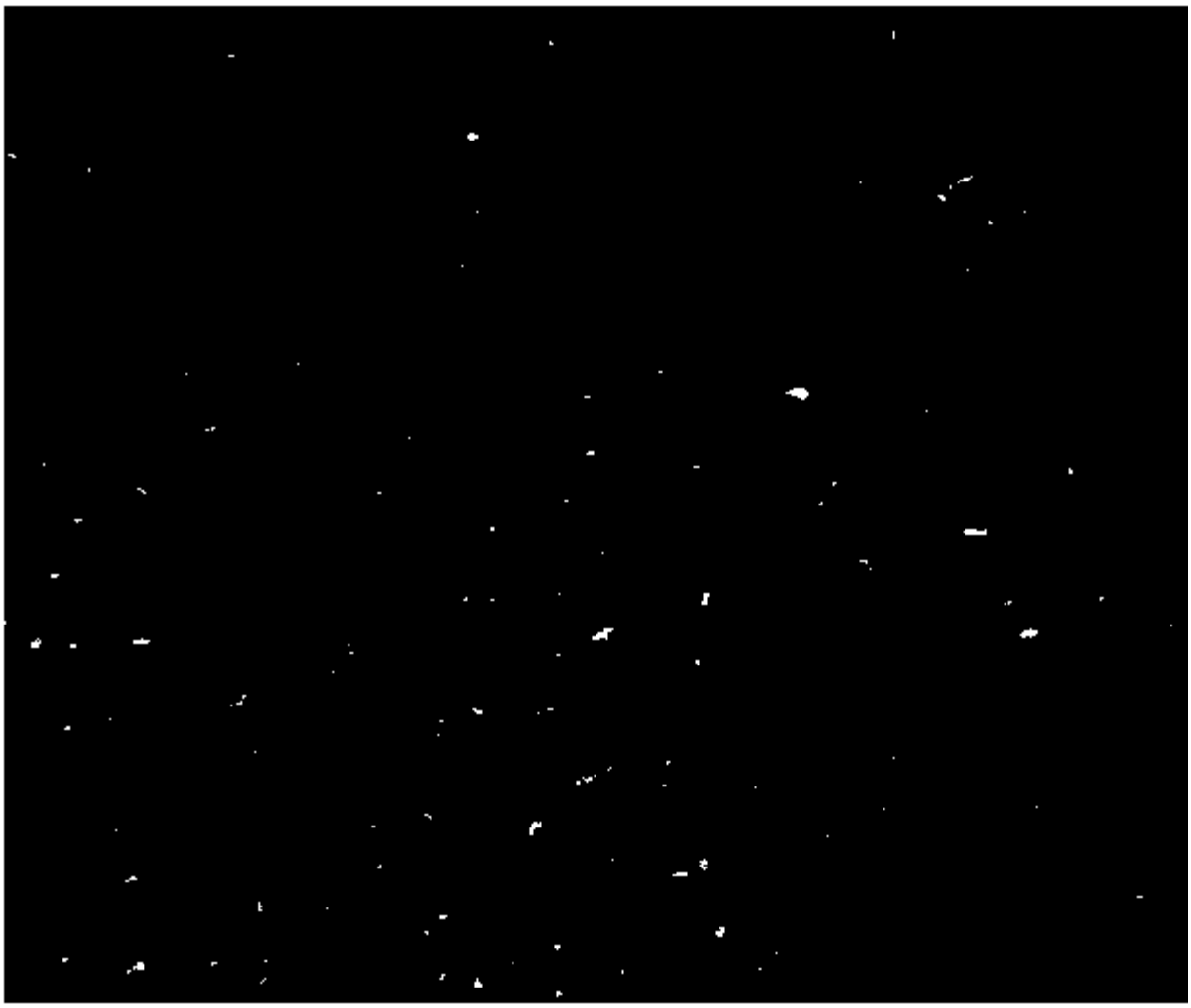
Warning: Image is too big to fit on screen; displaying at 67%

Warning: Image is too big to fit on screen; displaying at 67%

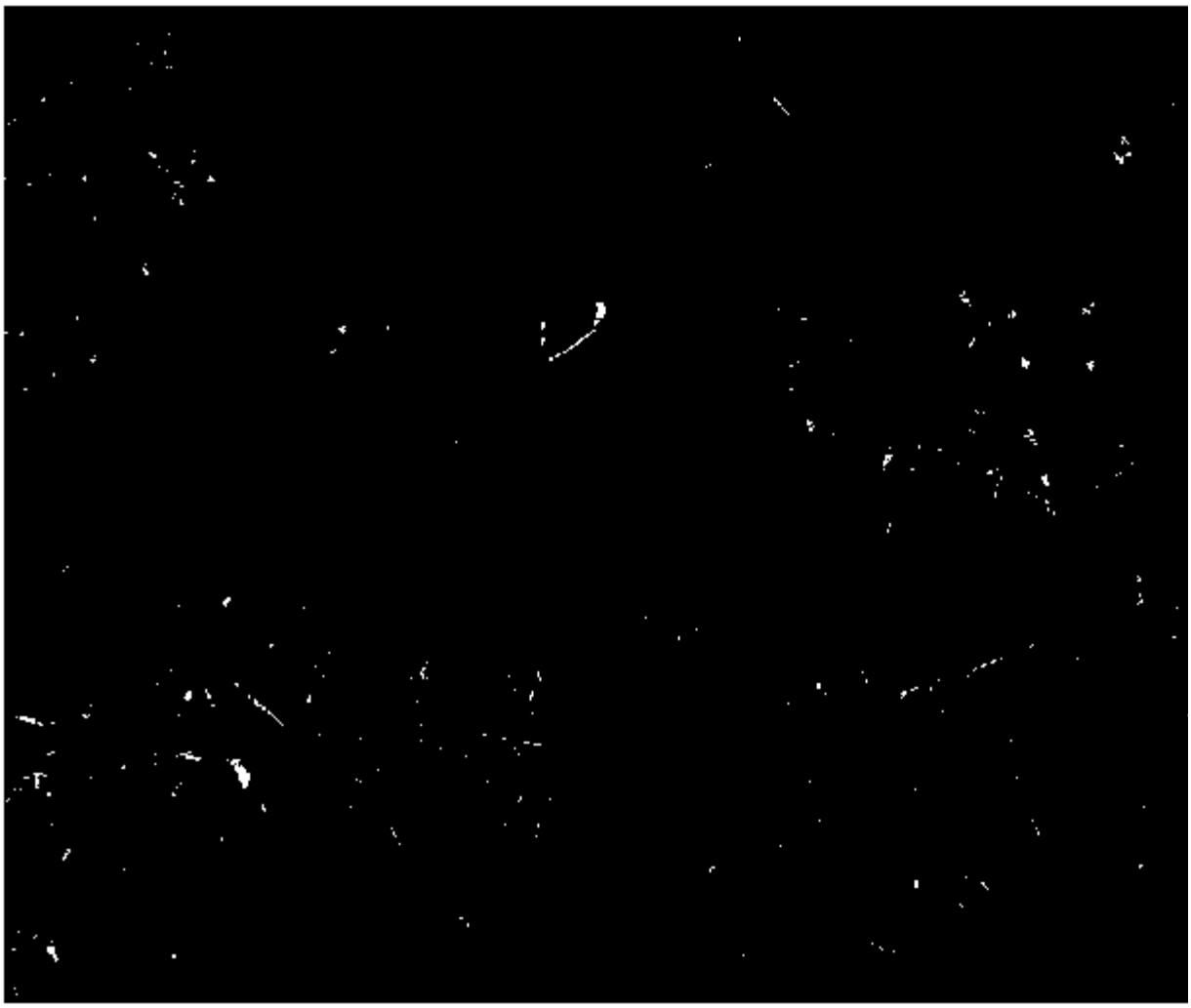
Warning: Image is too big to fit on screen; displaying at 67%



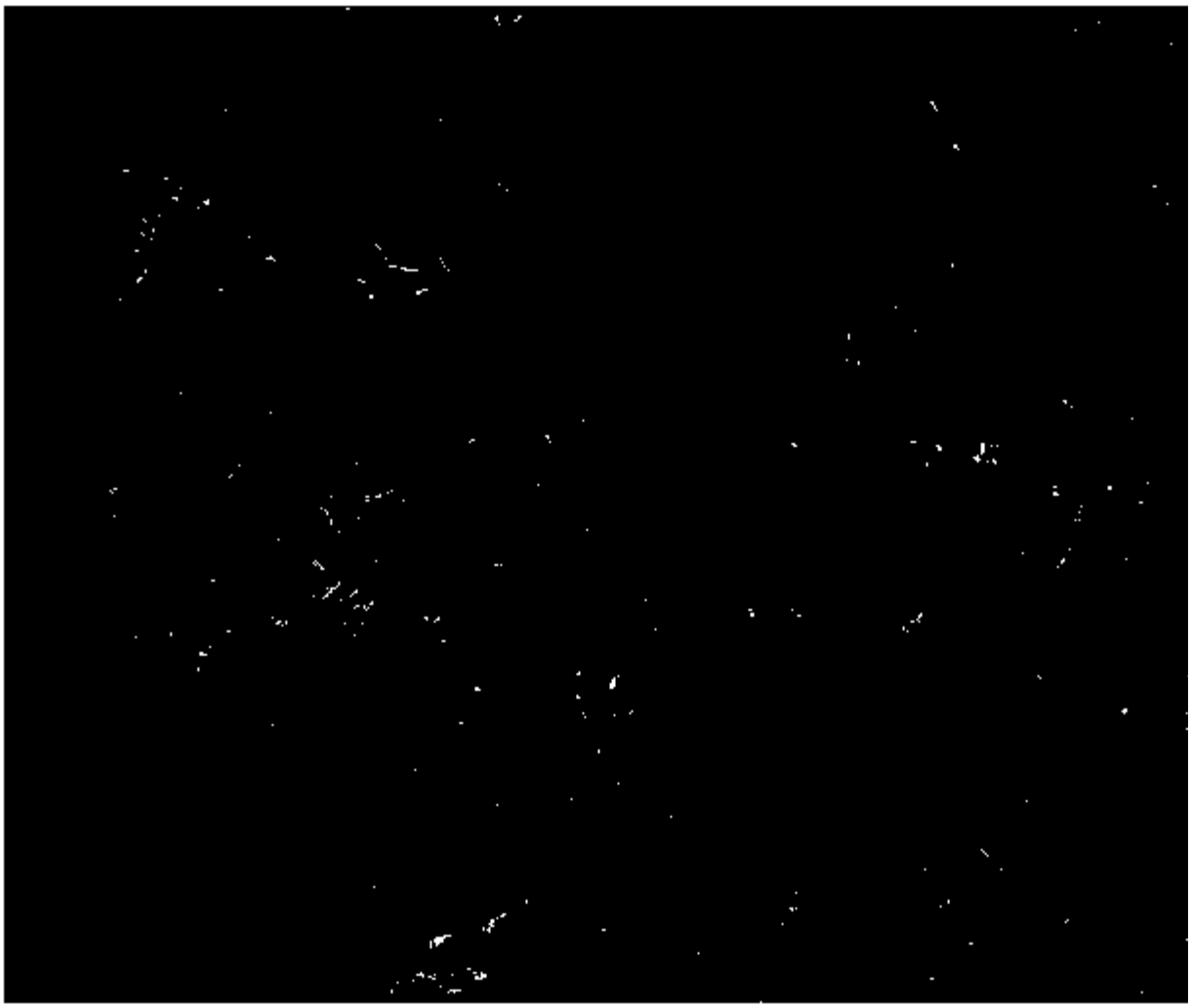
Warning: Image is too big to fit on screen; displaying at 67%



Warning: Image is too big to fit on screen; displaying at 67%



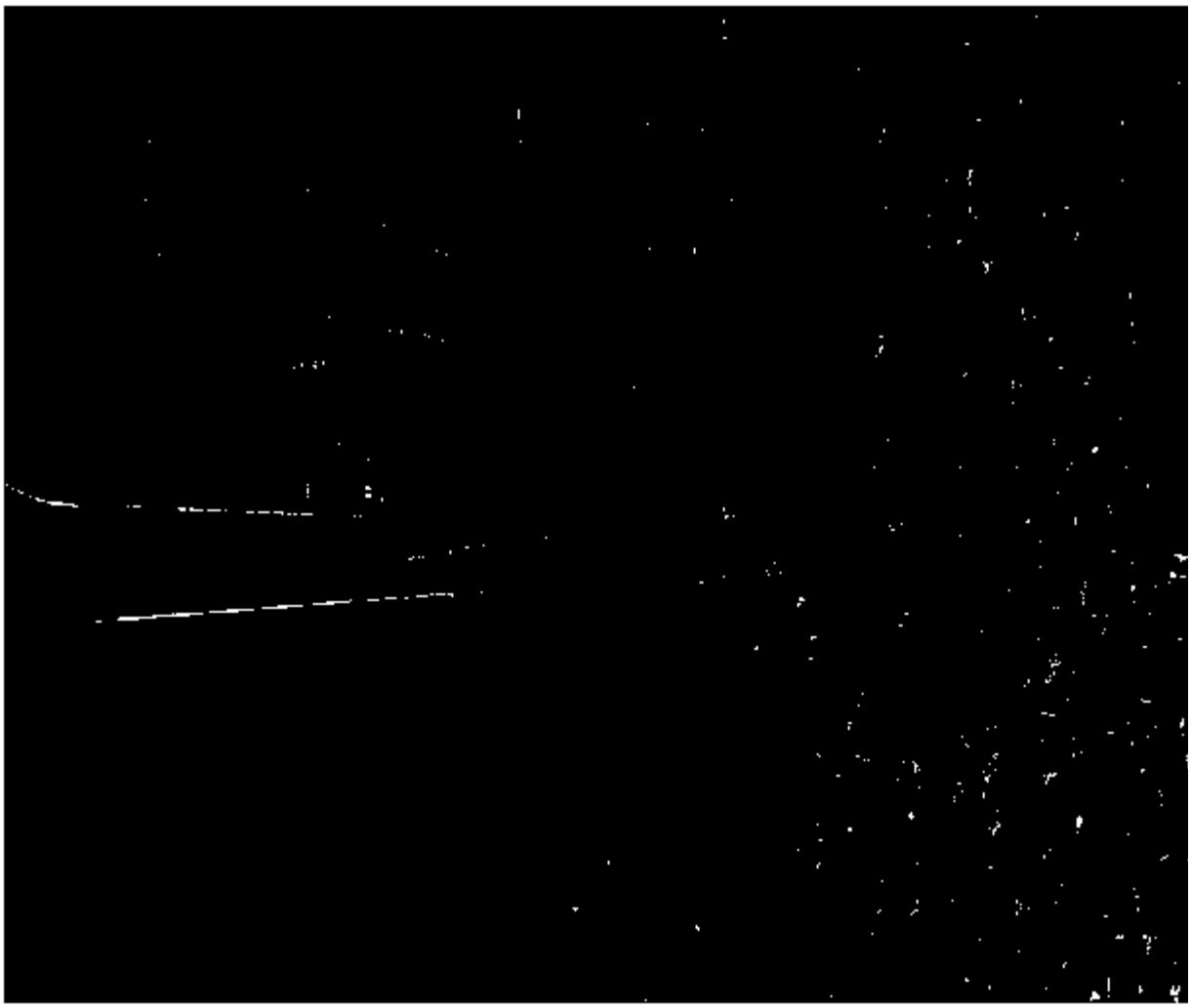
Warning: Image is too big to fit on screen; displaying at 67%



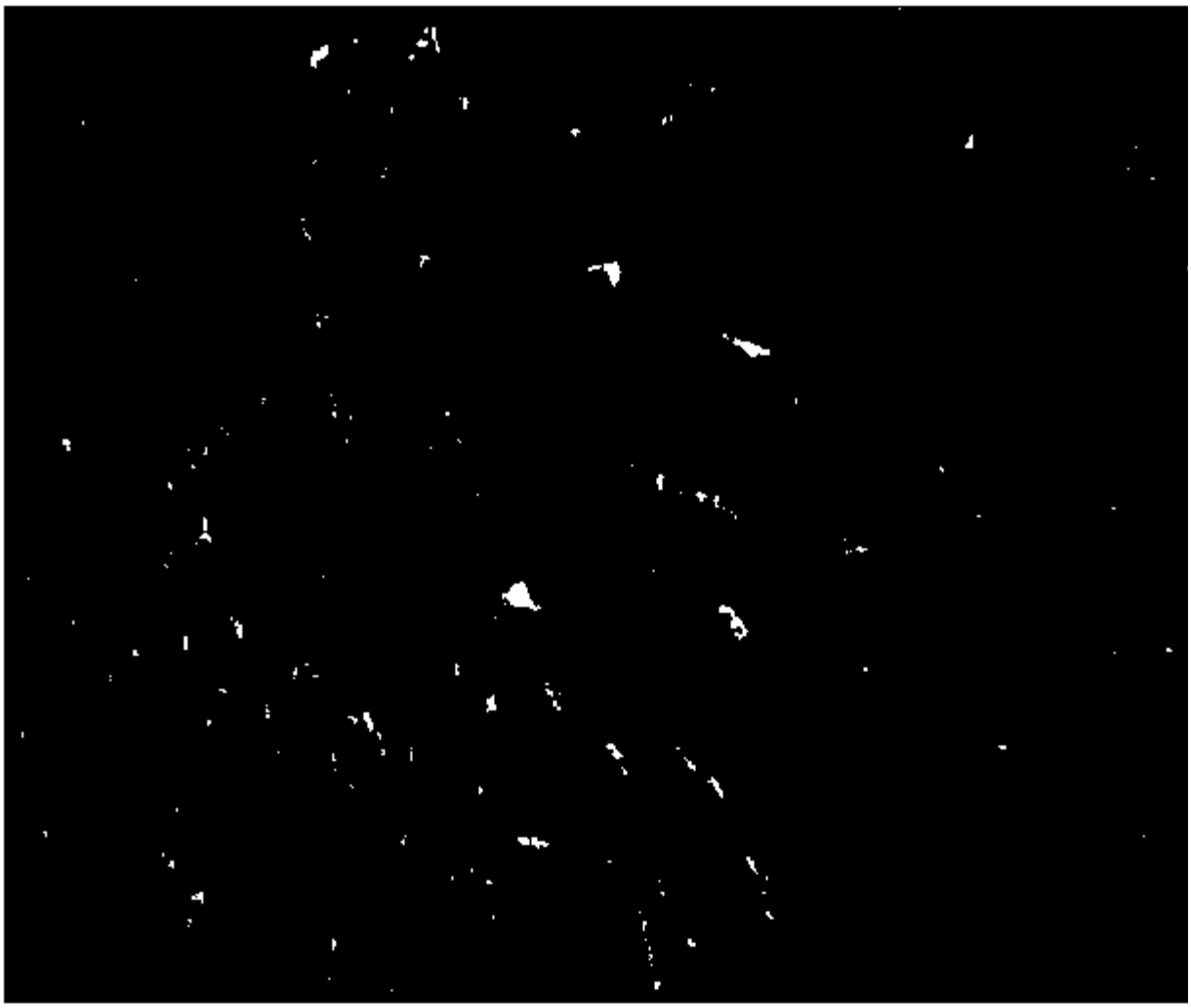
Warning: Image is too big to fit on screen; displaying at 67%

Warning: Image is too big to fit on screen; displaying at 67%

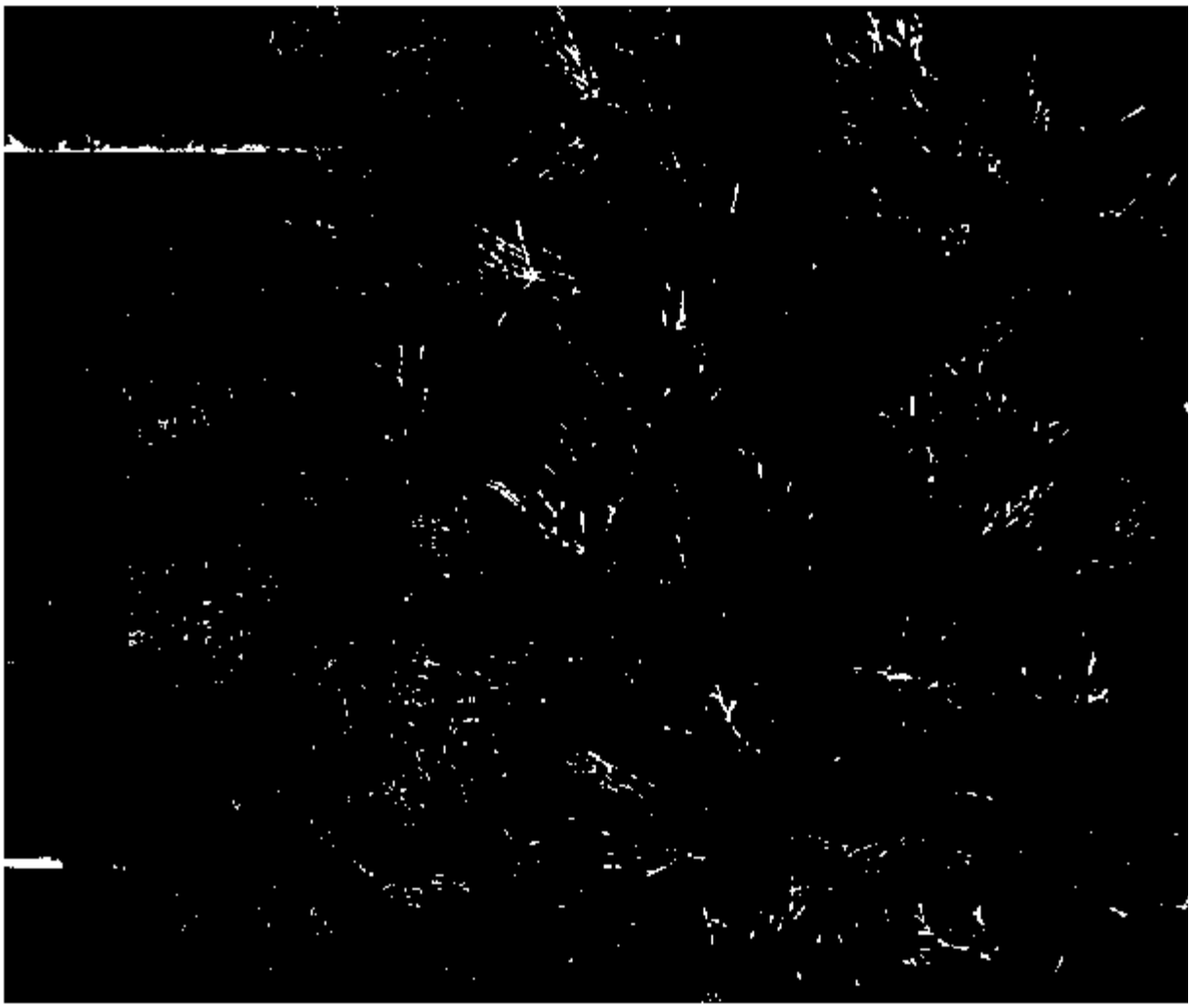
Warning: Image is too big to fit on screen; displaying at 67%



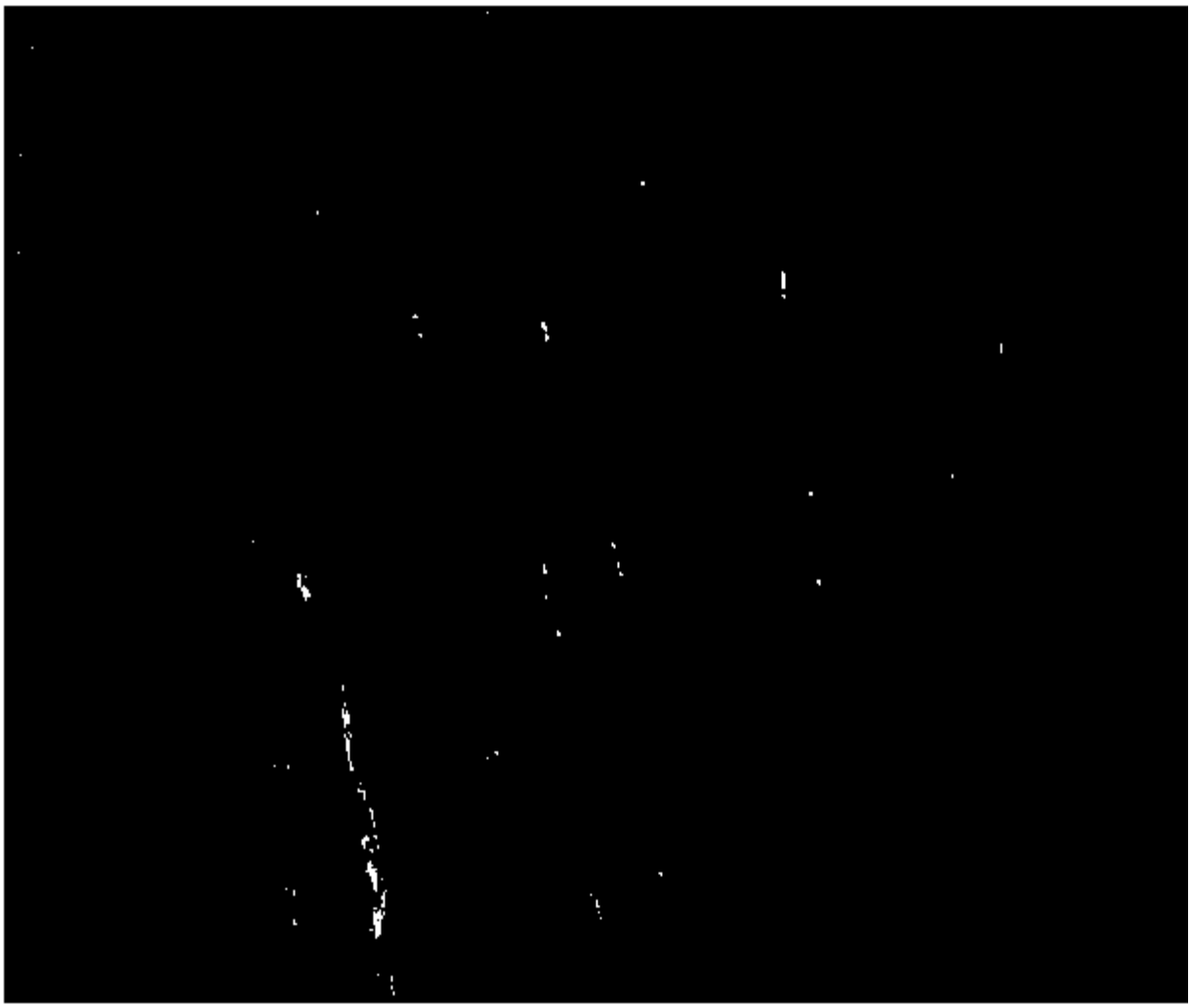
Warning: Image is too big to fit on screen; displaying at 67%



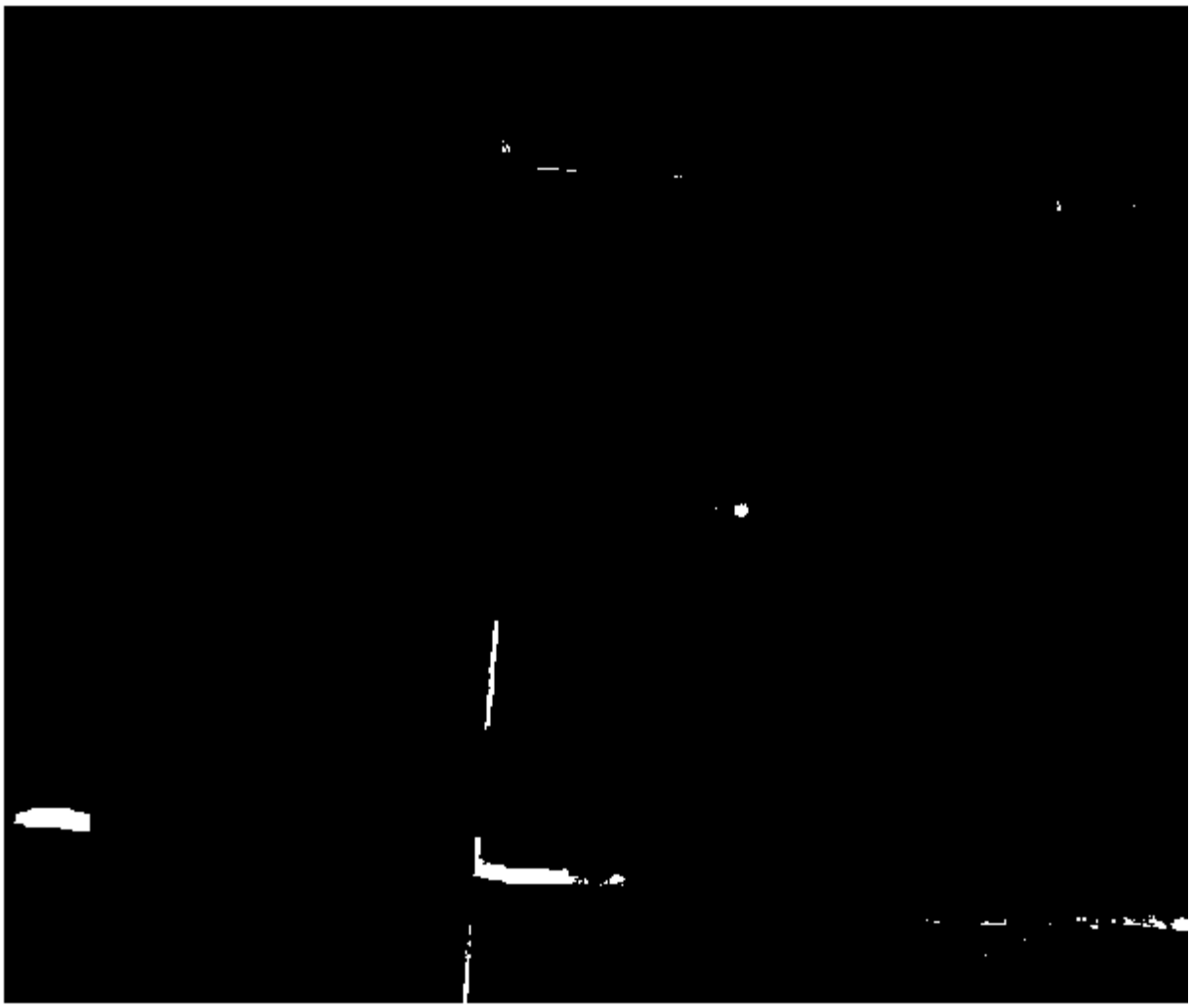
Warning: Image is too big to fit on screen; displaying at 67%



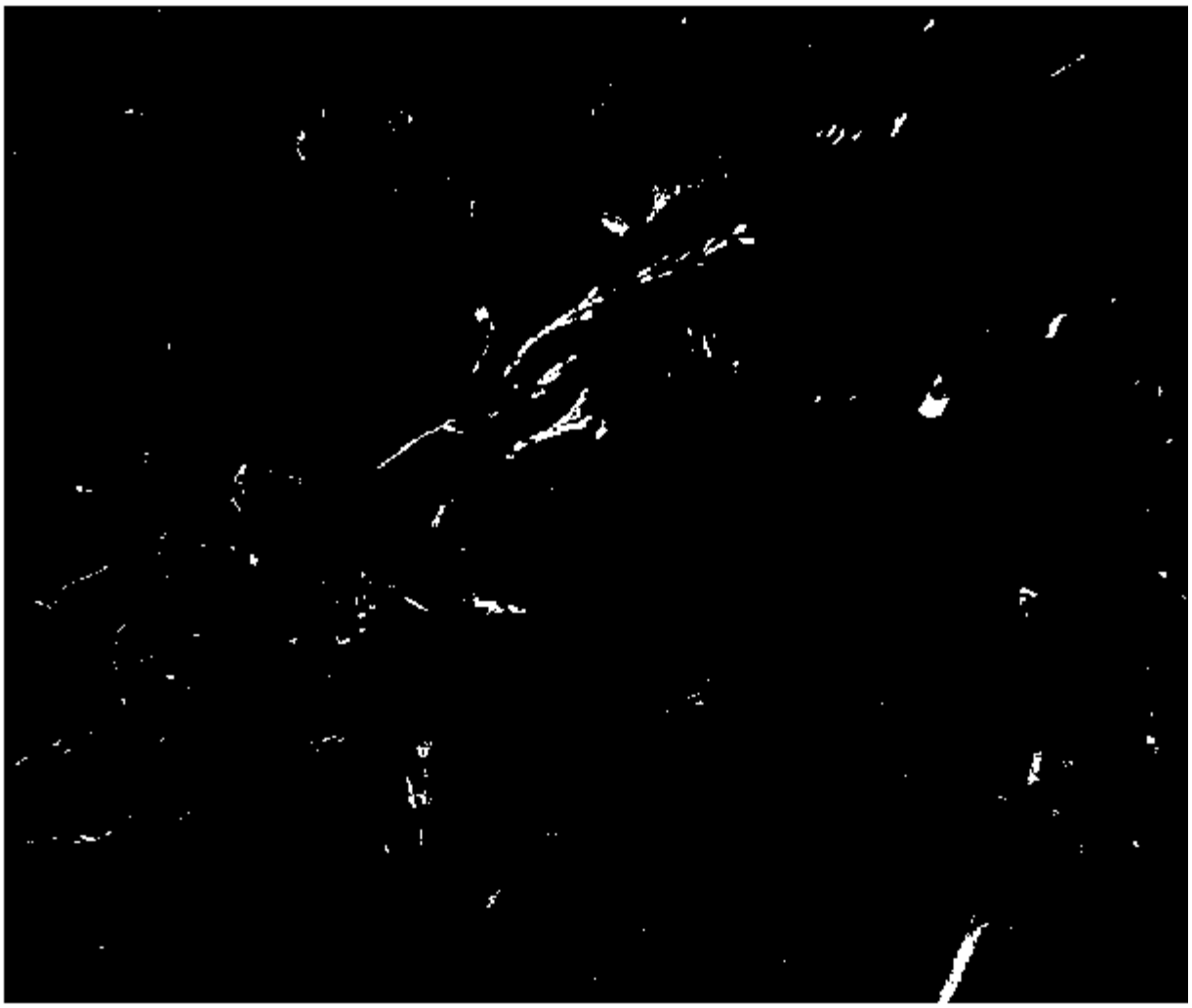
Warning: Image is too big to fit on screen; displaying at 67%



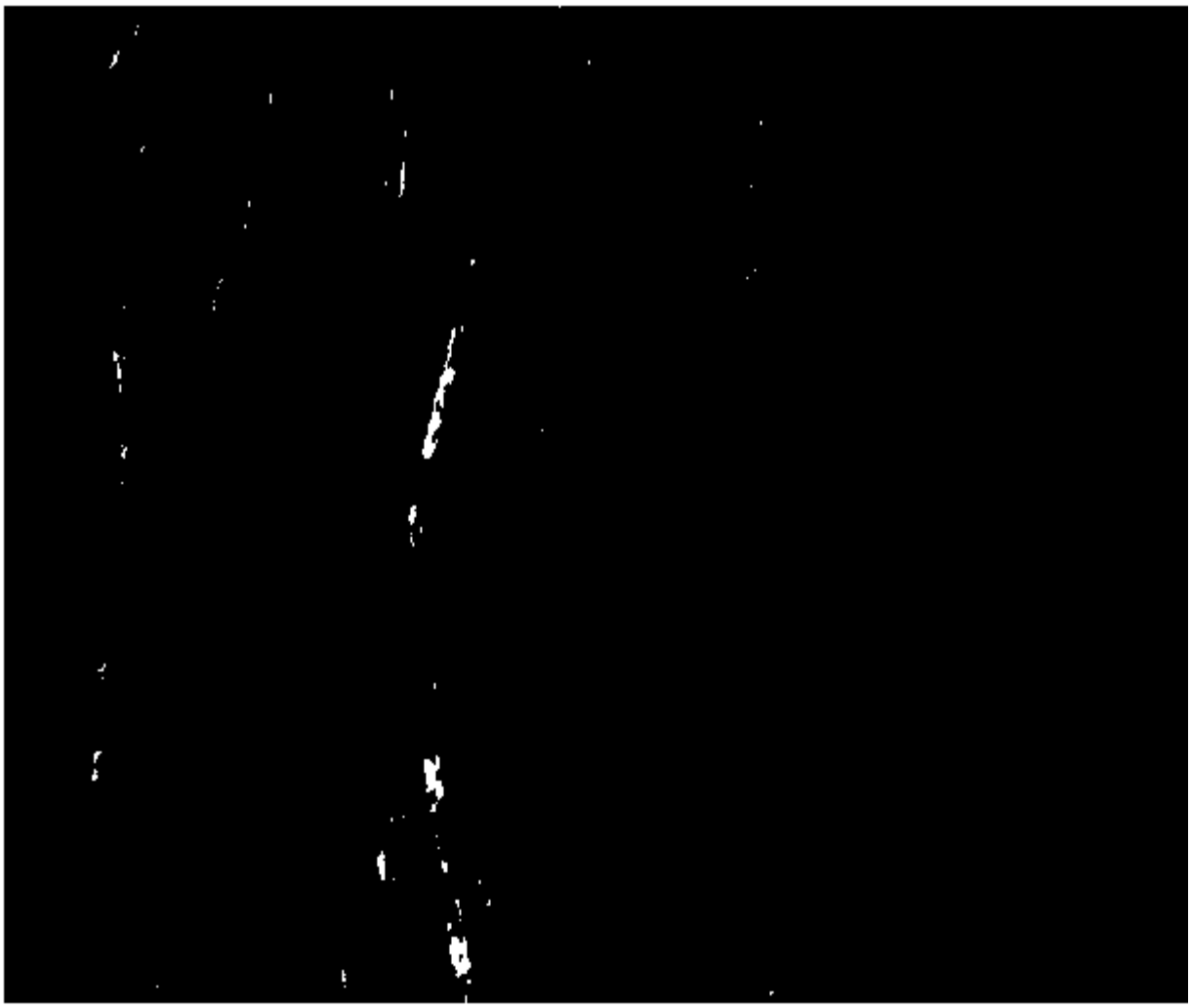
Warning: Image is too big to fit on screen; displaying at 67%



Warning: Image is too big to fit on screen; displaying at 67%

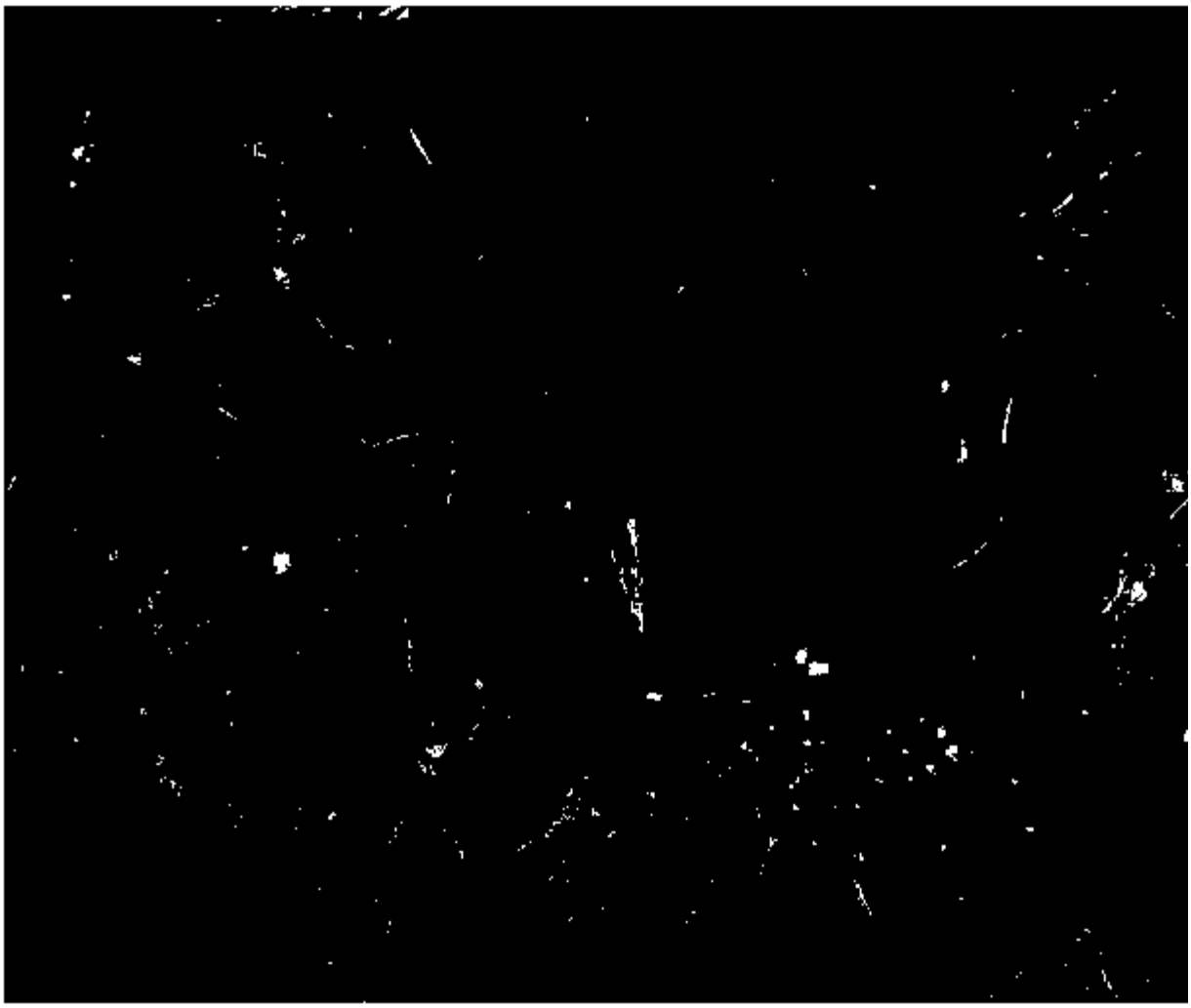


Warning: Image is too big to fit on screen; displaying at 67%



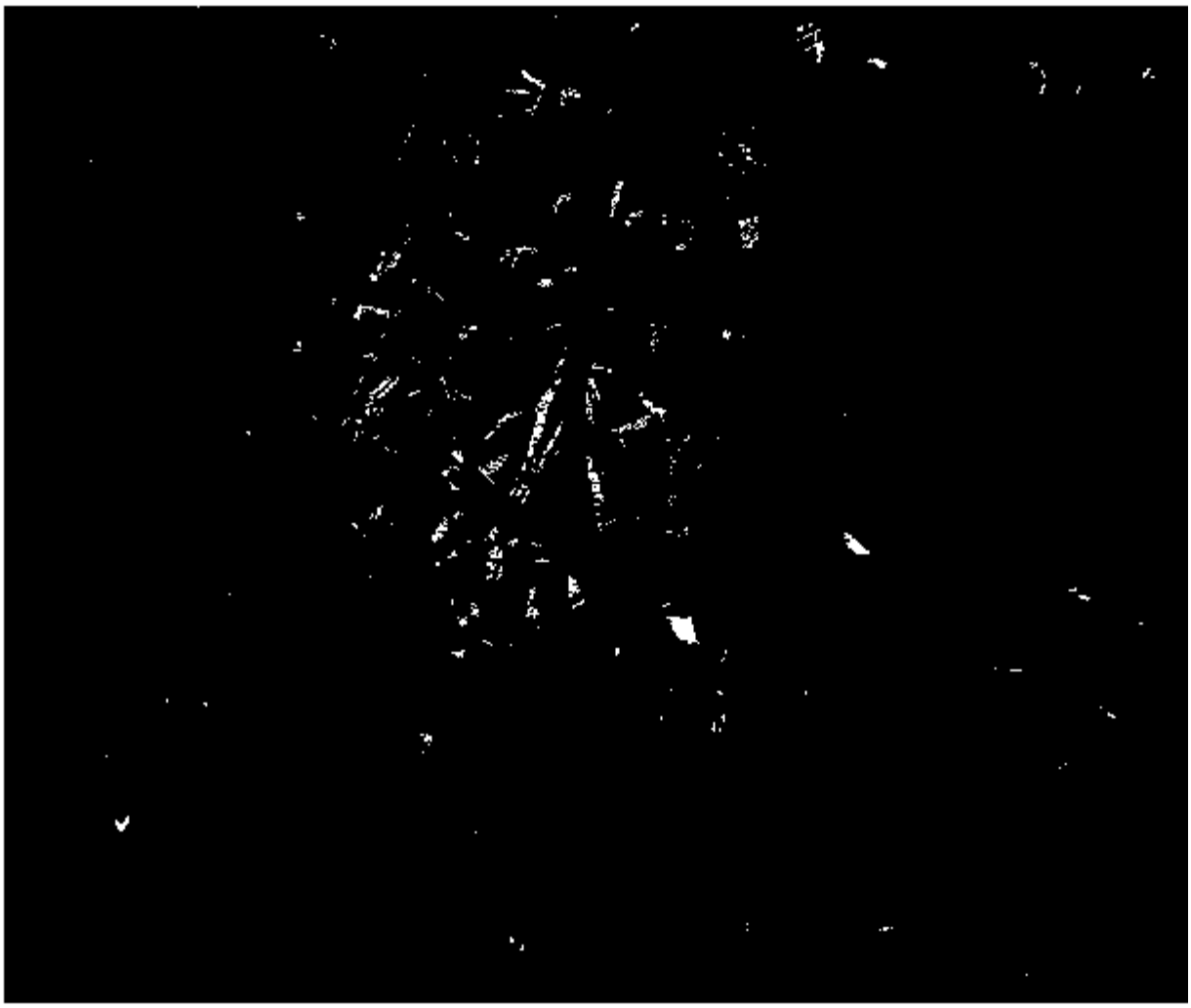
Warning: Image is too big to fit on screen; displaying at 67%

Warning: Image is too big to fit on screen; displaying at 67%

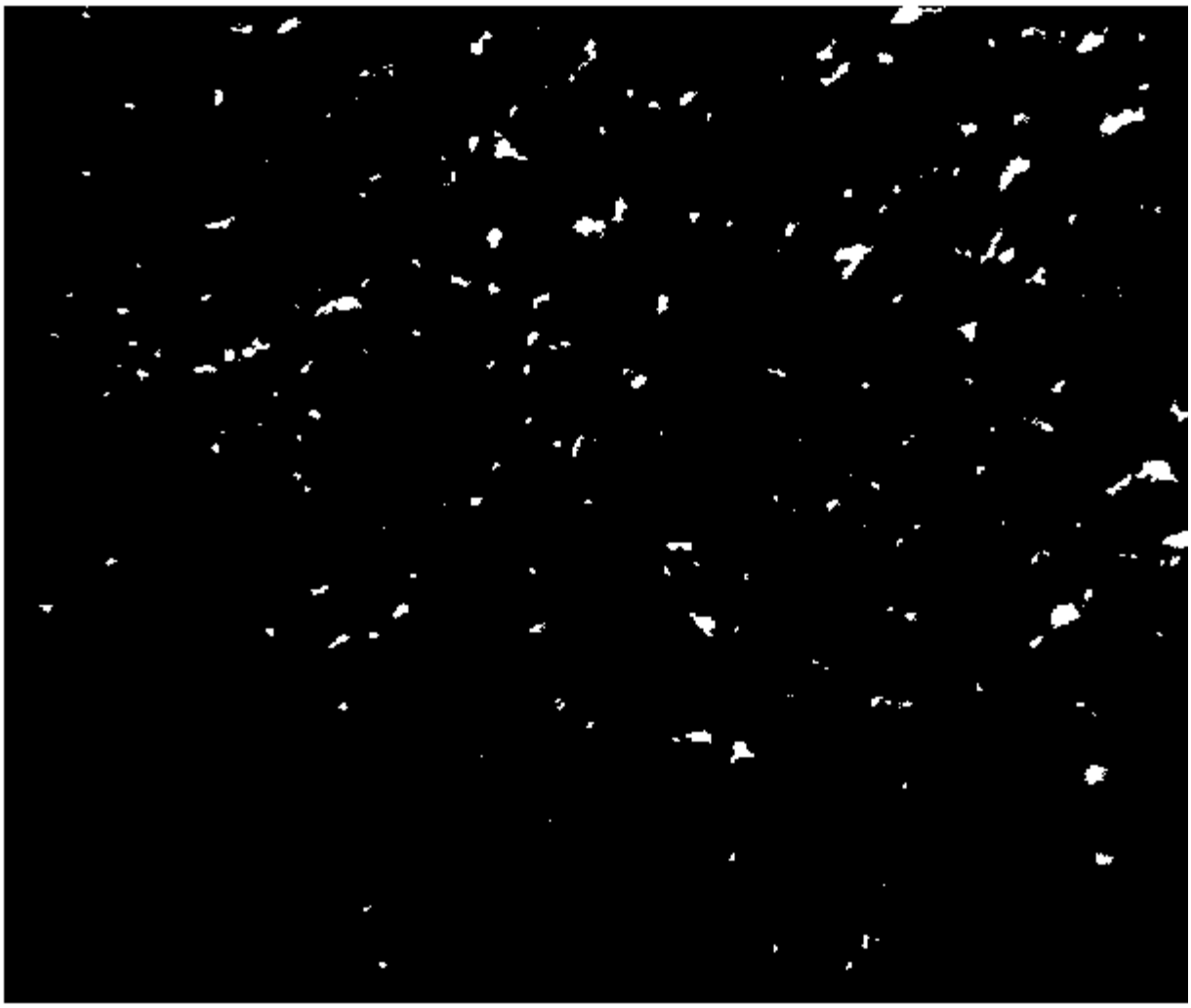


Warning: Image is too big to fit on screen; displaying at 67%

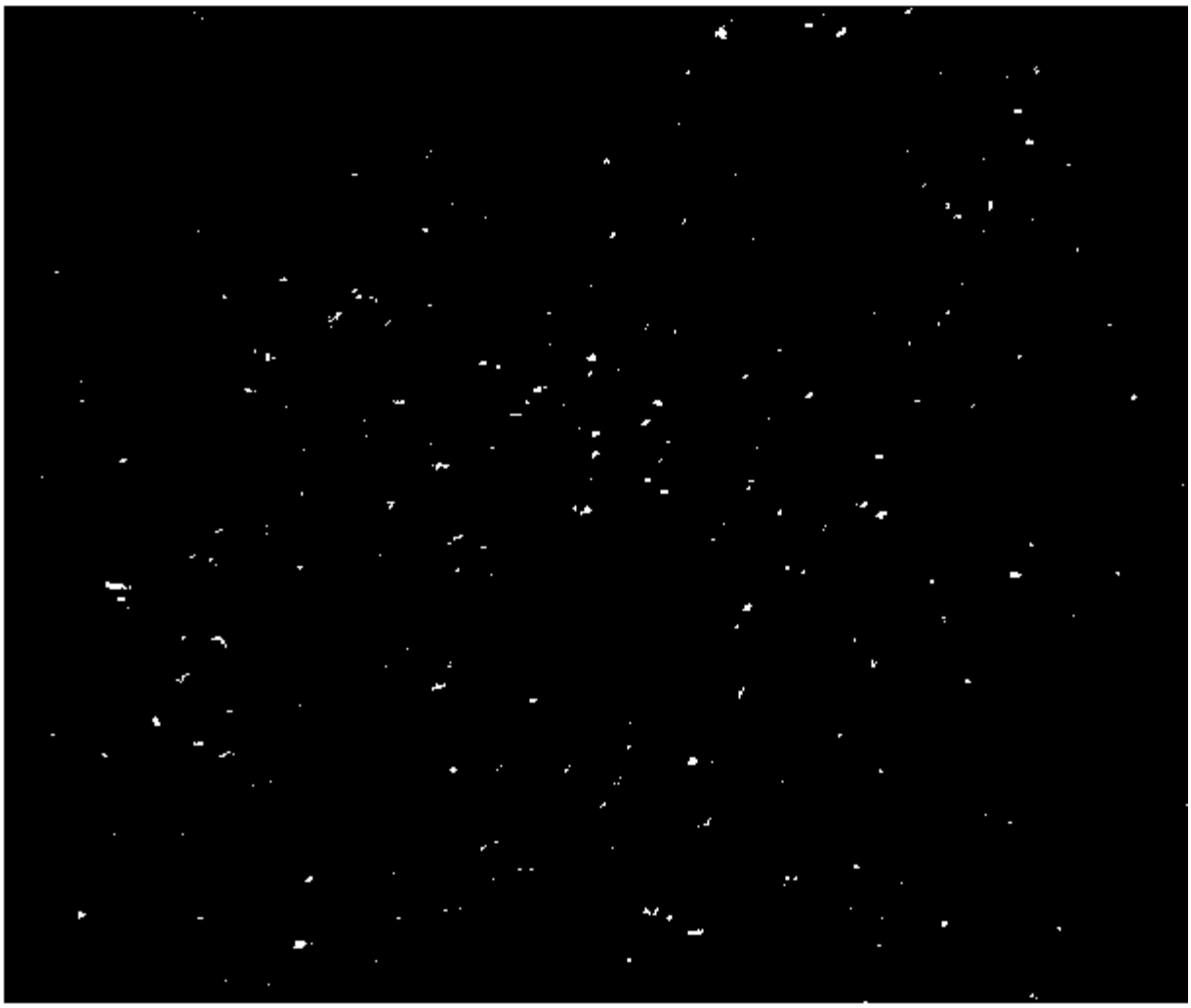
Warning: Image is too big to fit on screen; displaying at 67%



Warning: Image is too big to fit on screen; displaying at 67%

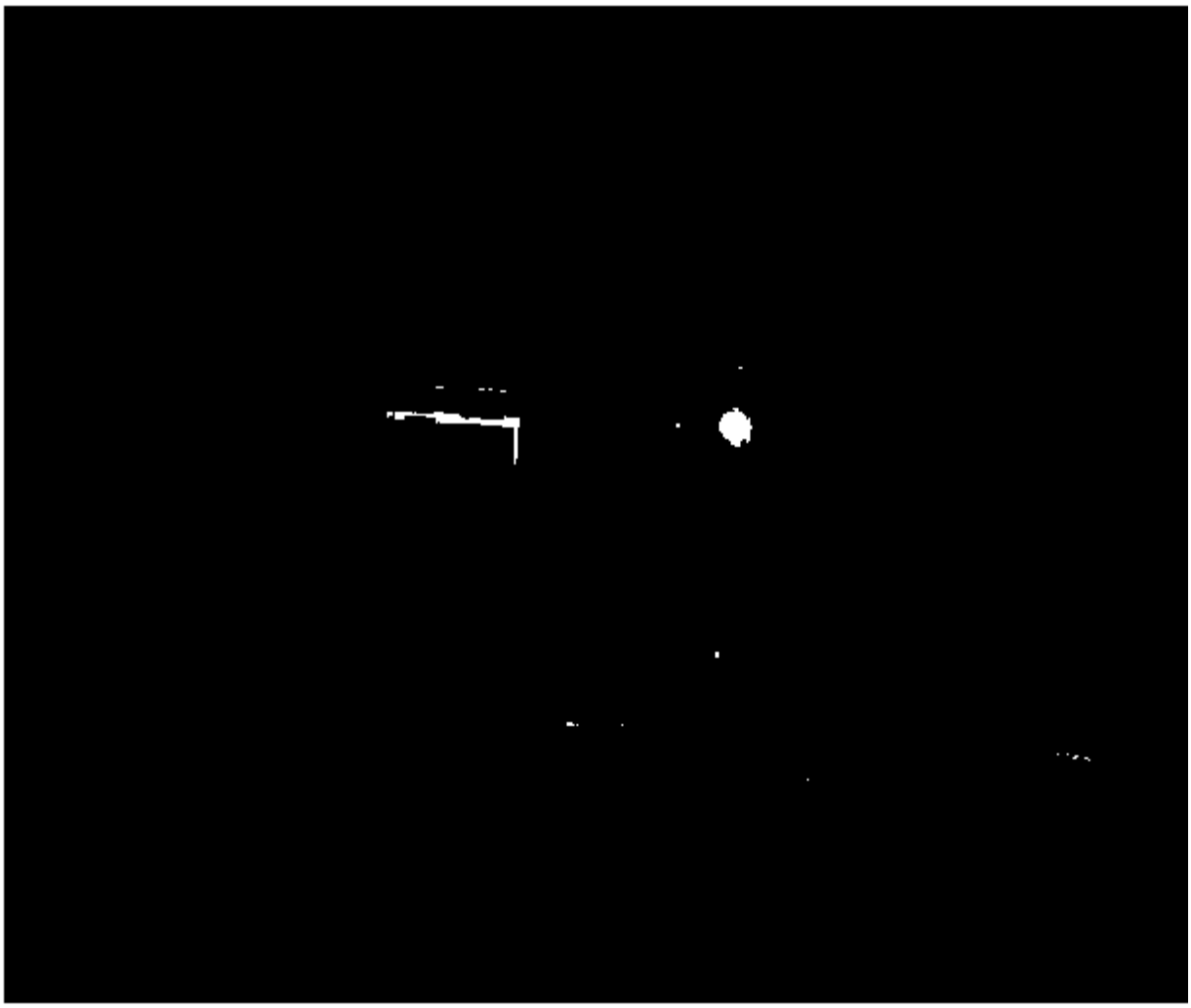


Warning: Image is too big to fit on screen; displaying at 67%



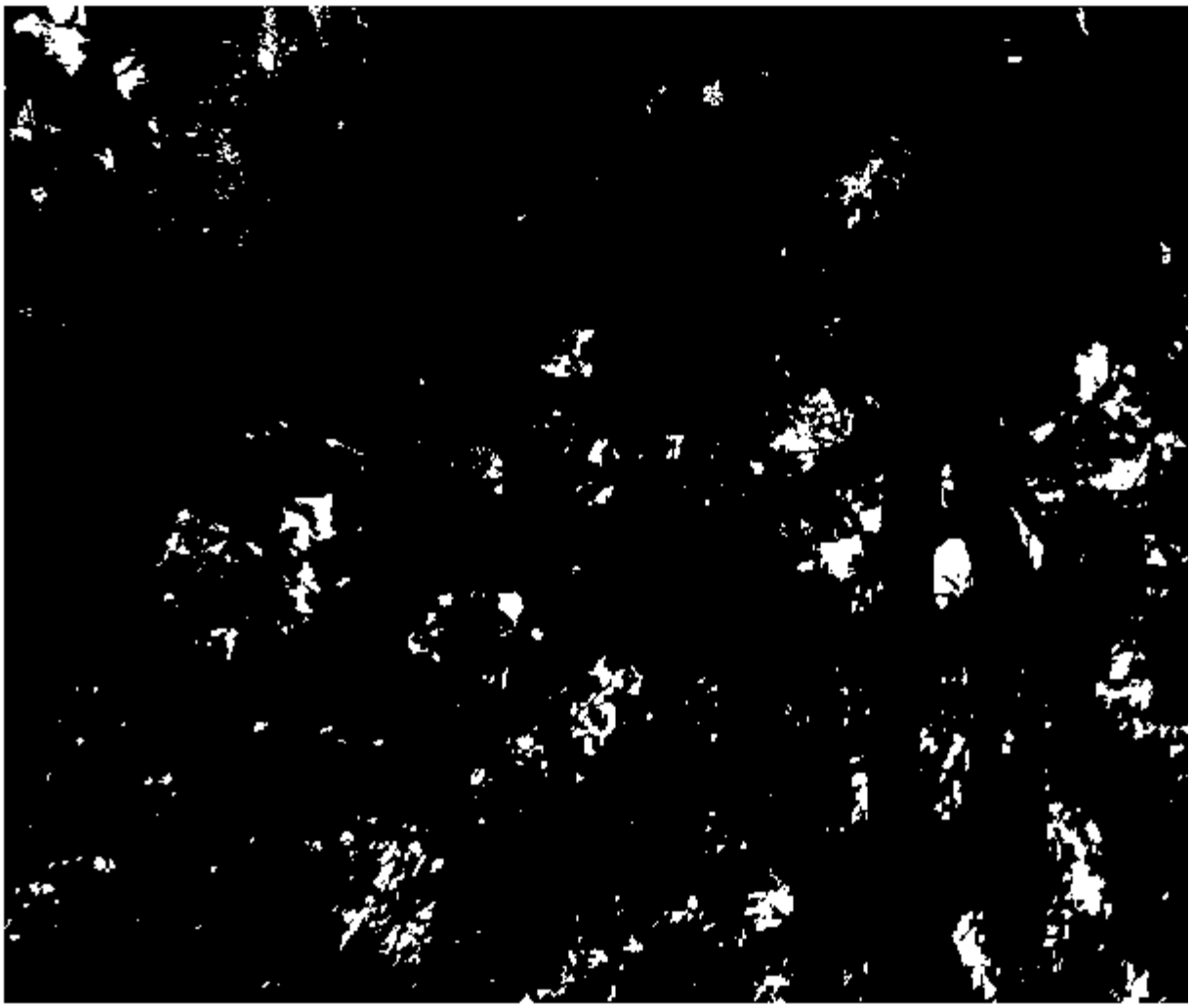
Warning: Image is too big to fit on screen; displaying at 67%

Warning: Image is too big to fit on screen; displaying at 67%

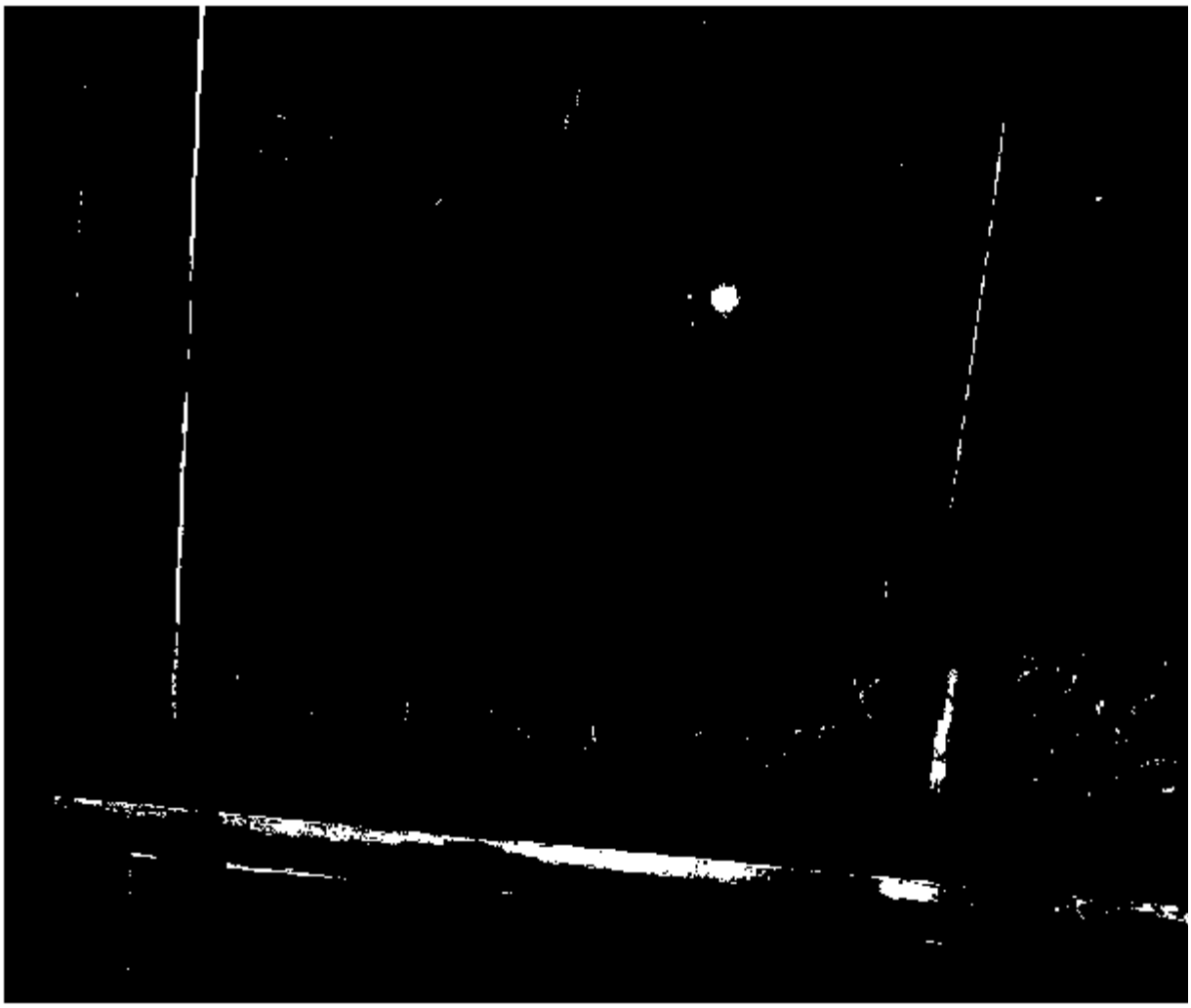


Warning: Image is too big to fit on screen; displaying at 67%

Warning: Image is too big to fit on screen; displaying at 67%



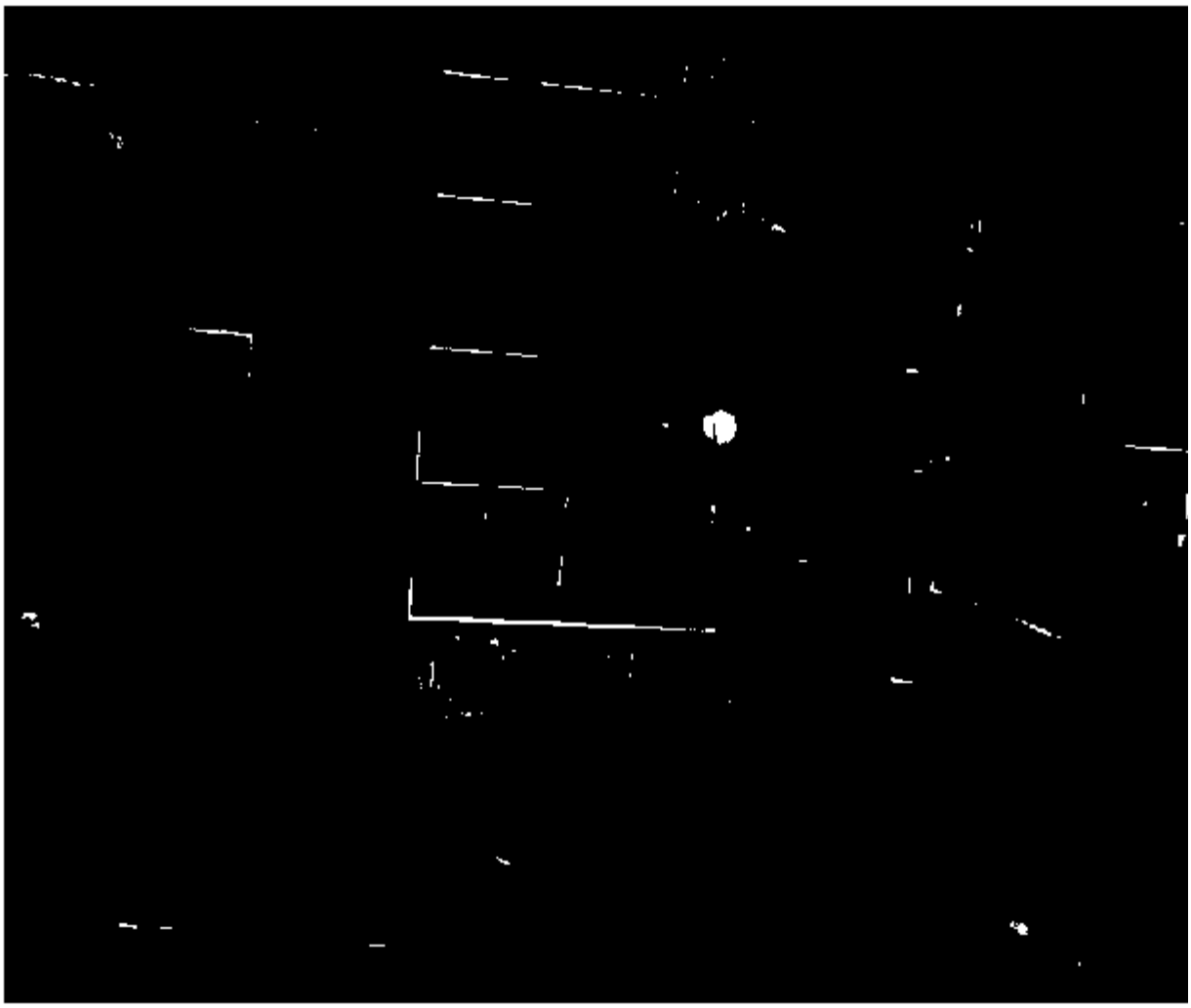
Warning: Image is too big to fit on screen; displaying at 67%



Warning: Image is too big to fit on screen; displaying at 67%

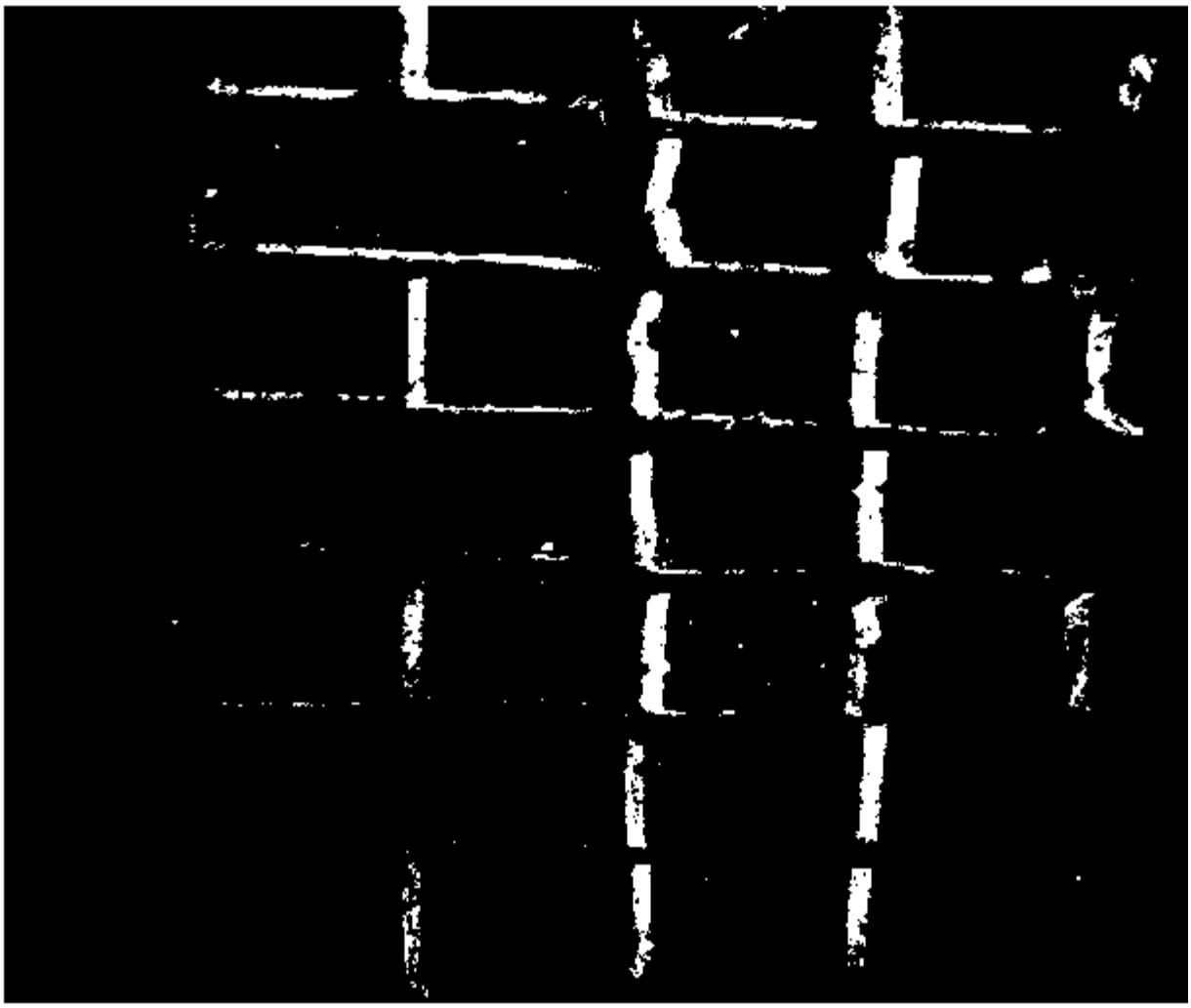
Warning: Image is too big to fit on screen; displaying at 67%

Warning: Image is too big to fit on screen; displaying at 67%

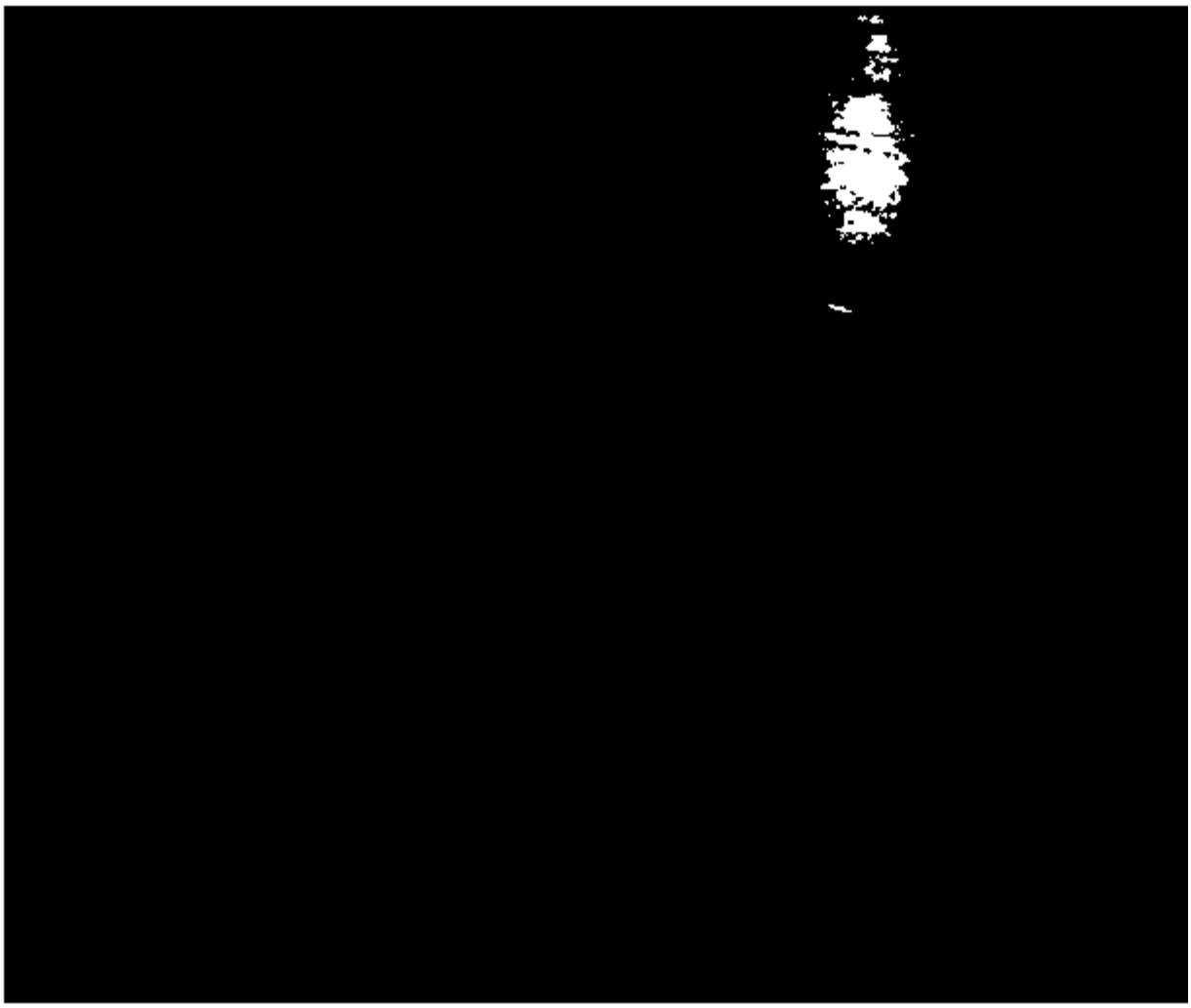


Warning: Image is too big to fit on screen; displaying at 67%

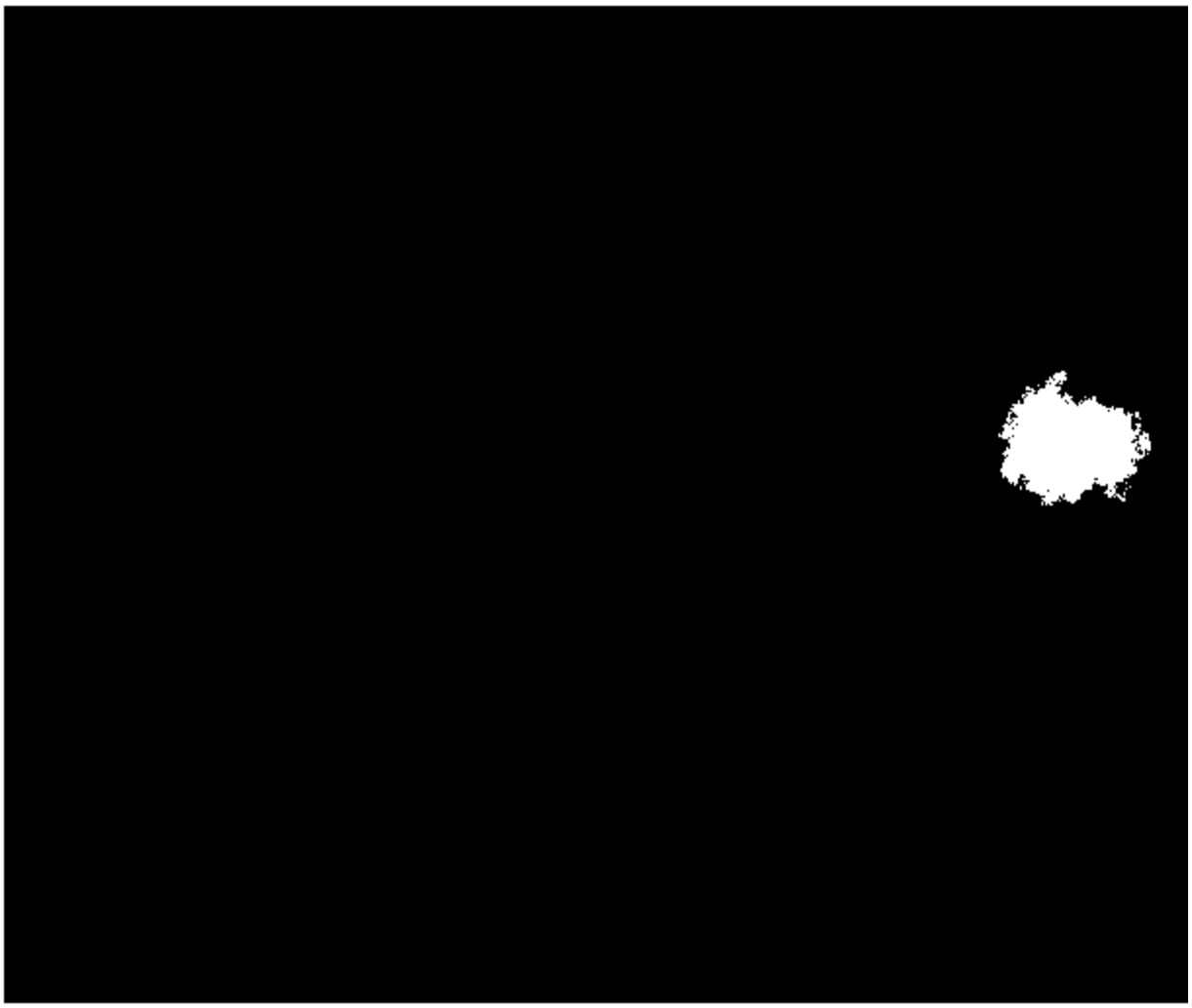
Warning: Image is too big to fit on screen; displaying at 67%



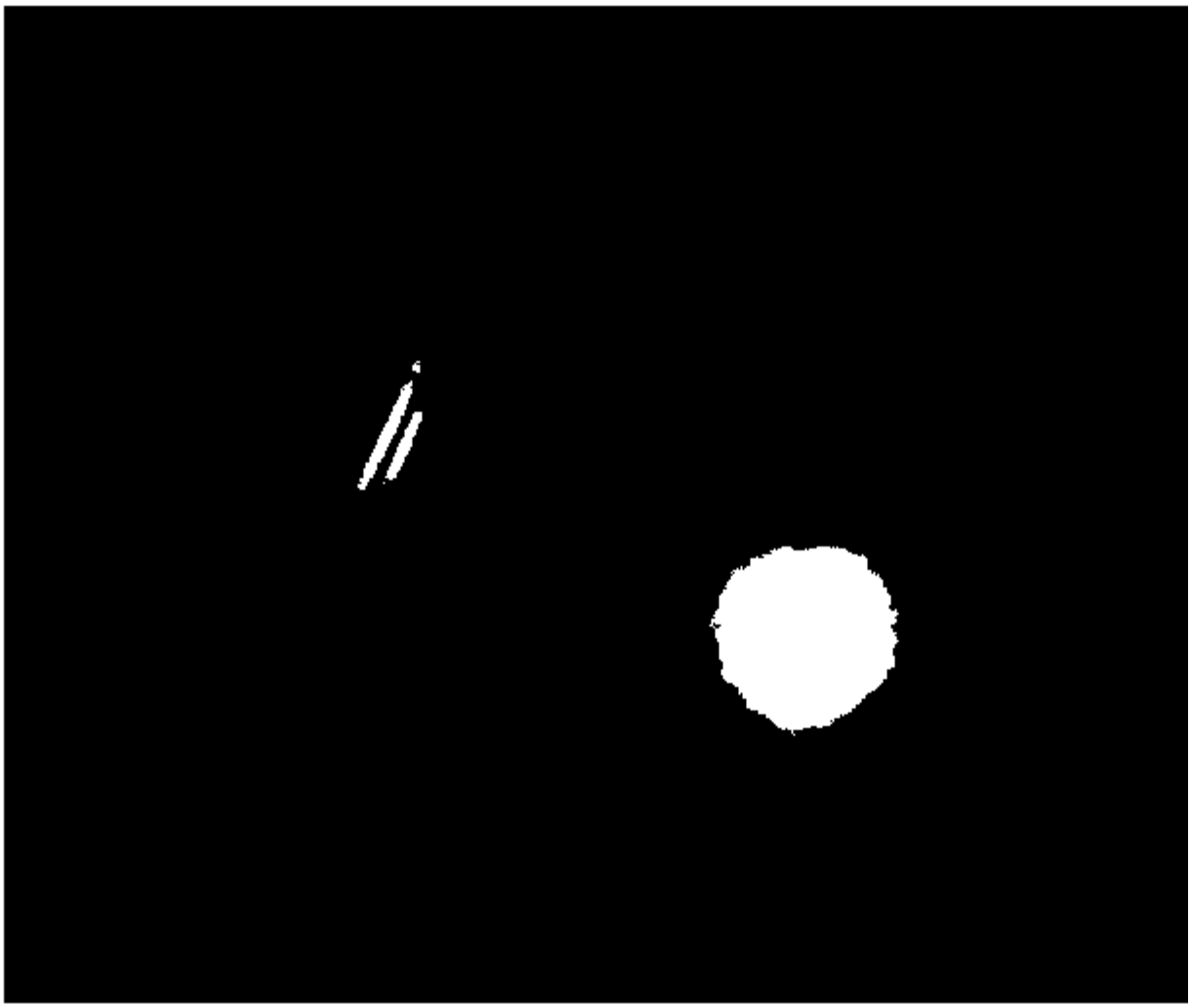
Warning: Image is too big to fit on screen; displaying at 67%



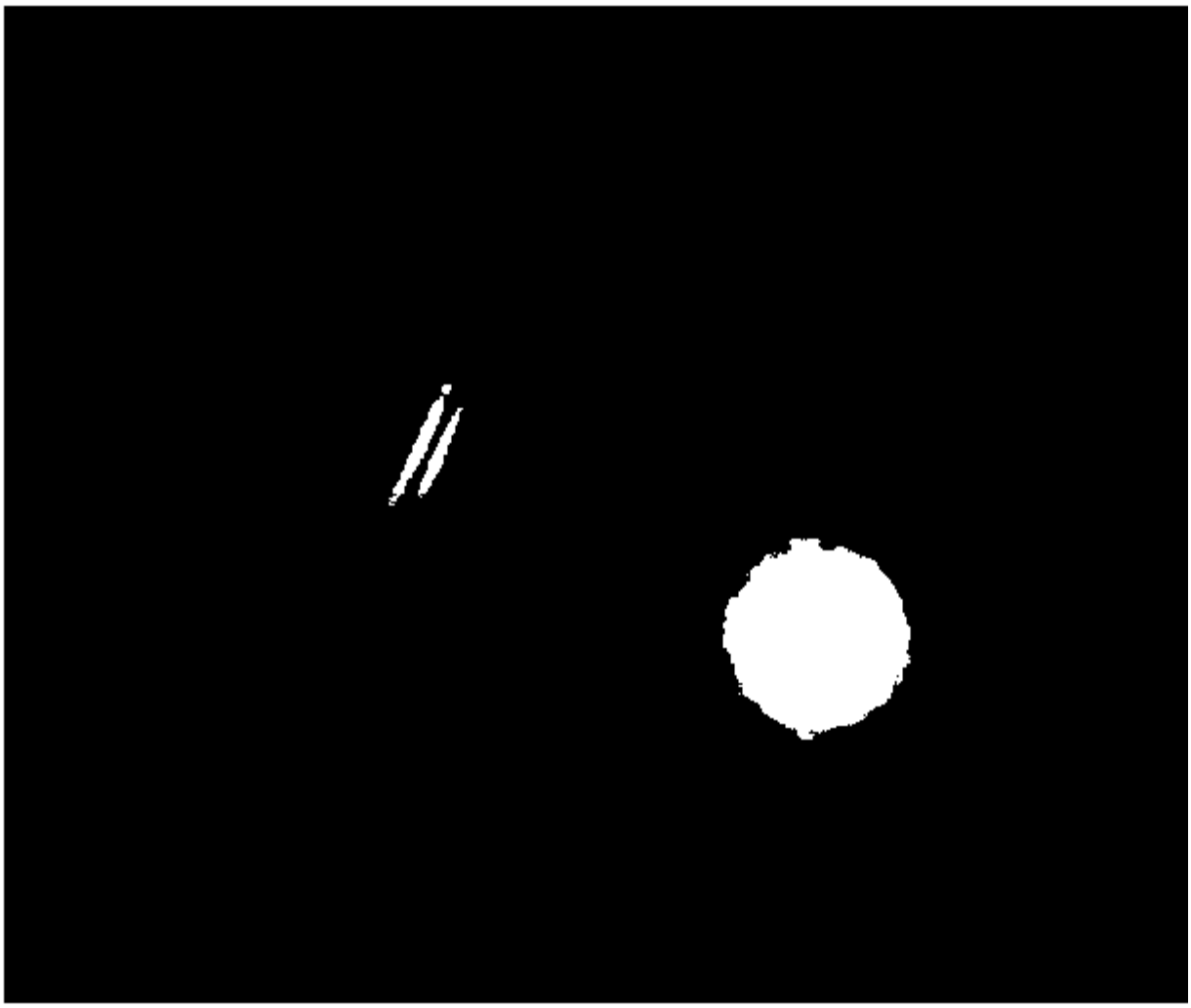
Warning: Image is too big to fit on screen; displaying at 67%



Warning: Image is too big to fit on screen; displaying at 67%

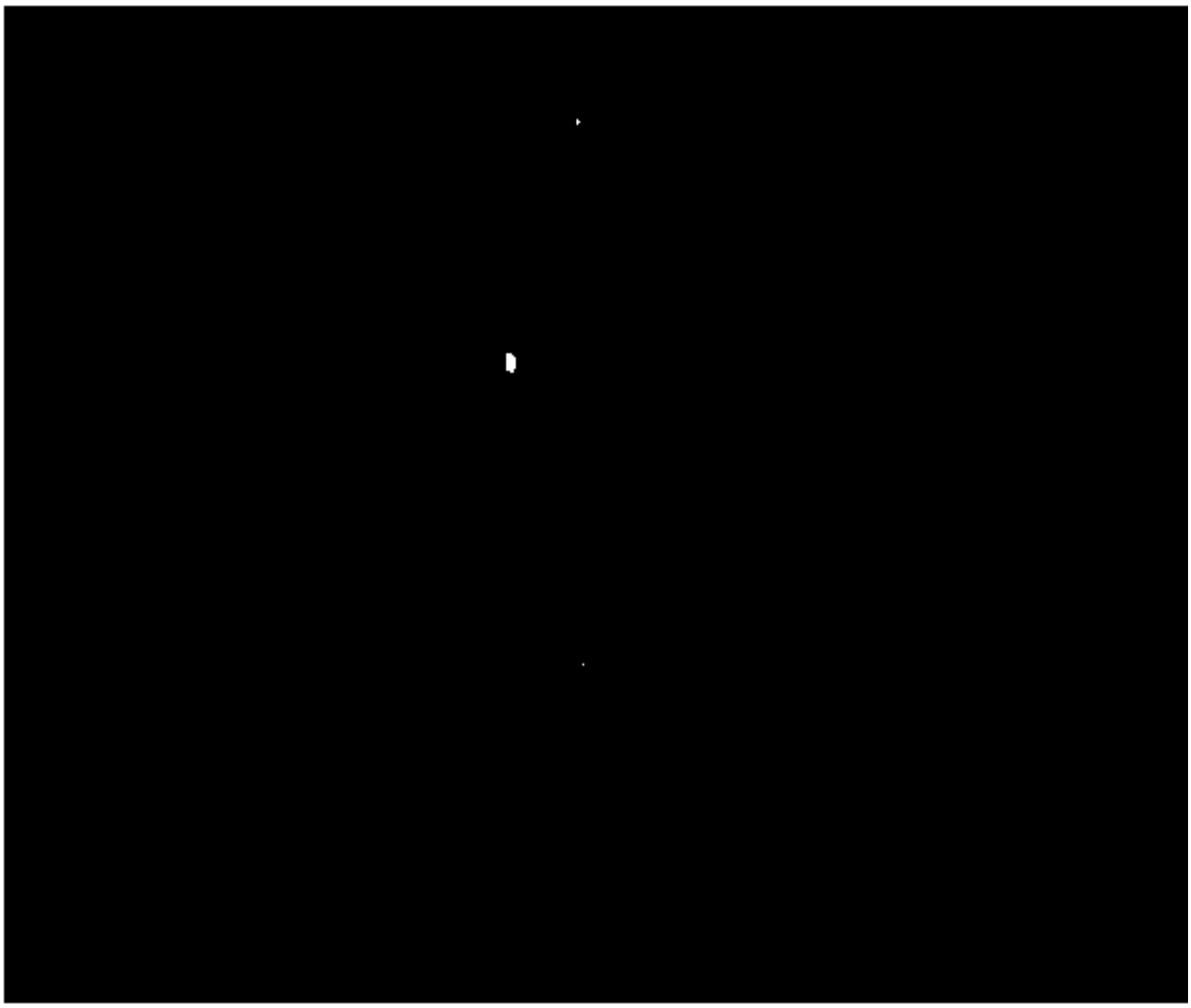


Warning: Image is too big to fit on screen; displaying at 67%



Warning: Image is too big to fit on screen; displaying at 67%

Warning: Image is too big to fit on screen; displaying at 67%



Warning: Image is too big to fit on screen; displaying at 67%

Warning: Image is too big to fit on screen; displaying at 67%

Warning: Image is too big to fit on screen; displaying at 67%

Warning: Image is too big to fit on screen; displaying at 67%

Warning: Image is too big to fit on screen; displaying at 67%

Warning: Image is too big to fit on screen; displaying at 67%

Output data to text file

```
        fileID2 = fopen('circleParams.txt','a+');
        fmt = '\n';
        line = strcat(base_filename,' NumRegions:',num2str(length(allAreas)),' MaxRegionArea:',
        fprintf(fileID2,'%s\n',line{1});
        fclose(fileID2);
```

```
line =

    '2016-11-12 04:21:10 NumRegions:25 MaxRegionArea:41'
```

```
line =

    '2016-11-12 04:23:02 NumRegions:46 MaxRegionArea:53'
```

```
line =

    '2016-11-12 04:24:56 NumRegions:30 MaxRegionArea:14390'


line =

    '2016-11-12 04:25:21 NumRegions:40 MaxRegionArea:7902'


line =

    '2016-11-12 04:35:36 NumRegions:1 MaxRegionArea:40'


line =

    '2016-11-12 04:37:45 NumRegions:1423 MaxRegionArea:111007'


line =

    '2016-11-12 04:38:11 NumRegions:63 MaxRegionArea:853'


line =

    '2016-11-12 04:38:33 NumRegions:2 MaxRegionArea:1'


line =

    '2016-11-12 04:38:57 NumRegions:73 MaxRegionArea:23876'


line =

    '2016-11-12 04:39:09 NumRegions:44 MaxRegionArea:16337'


line =

    '2016-11-12 04:39:36 NumRegions:3 MaxRegionArea:3144'


line =

    '2016-11-12 04:39:55 NumRegions:2 MaxRegionArea:3639'


line =

    '2016-11-12 04:40:19 NumRegions:2336 MaxRegionArea:412391'
```

```
line =

    '2016-11-12 04:42:06 NumRegions:18 MaxRegionArea:3194'


line =

    '2016-11-12 04:42:18 NumRegions:21 MaxRegionArea:2227'


line =

    '2016-11-12 04:42:34 NumRegions:18 MaxRegionArea:1721'


line =

    '2016-11-12 04:42:45 NumRegions:5 MaxRegionArea:16'


line =

    '2016-11-12 04:42:58 NumRegions:1 MaxRegionArea:14'


line =

    '2016-11-12 04:43:21 NumRegions:1458 MaxRegionArea:1852'


line =

    '2016-11-12 04:43:34 NumRegions:29 MaxRegionArea:13259'


line =

    '2016-11-12 04:43:45 NumRegions:53 MaxRegionArea:6693'


line =

    '2016-11-12 04:44:06 NumRegions:3 MaxRegionArea:114'


line =

    '2016-11-12 04:44:32 NumRegions:5 MaxRegionArea:2801'


line =

    '2016-11-12 04:45:24 NumRegions:78 MaxRegionArea:5'


line =
```

```
    '2016-11-12 04:45:53 NumRegions:336 MaxRegionArea:7742'

line =

    '2016-11-12 04:46:11 NumRegions:27 MaxRegionArea:35'

line =

    '2016-11-12 04:46:40 NumRegions:13 MaxRegionArea:21400'

line =

    '2016-11-12 04:47:01 NumRegions:9 MaxRegionArea:165'

line =

    '2016-11-12 04:47:18 NumRegions:156 MaxRegionArea:3711'

line =

    '2016-11-12 04:47:41 NumRegions:7 MaxRegionArea:37'

line =

    '2016-11-12 04:48:01 NumRegions:39 MaxRegionArea:365'

line =

    '2016-11-12 04:48:11 NumRegions:4 MaxRegionArea:278'

line =

    '2016-11-12 04:48:26 NumRegions:7 MaxRegionArea:635'

line =

    '2016-11-12 04:48:54 NumRegions:42 MaxRegionArea:307'

line =

    '2016-11-12 04:50:18 NumRegions:3 MaxRegionArea:5265'

line =
```

```
    '2016-11-12 04:50:34 NumRegions:10 MaxRegionArea:2772'

line =

    '2016-11-12 04:52:31 NumRegions:1196 MaxRegionArea:33'

line =

    '2016-11-12 04:52:43 NumRegions:361 MaxRegionArea:243'

line =

    '2016-11-12 04:52:57 NumRegions:308 MaxRegionArea:1853'

line =

    '2016-11-12 04:53:10 NumRegions:244 MaxRegionArea:53'

line =

    '2016-11-12 04:53:33 NumRegions:149 MaxRegionArea:216'

line =

    '2016-11-12 04:54:03 NumRegions:372 MaxRegionArea:164'

line =

    '2016-11-12 04:54:21 NumRegions:305 MaxRegionArea:57'

line =

    '2016-11-12 04:54:39 NumRegions:138 MaxRegionArea:300'

line =

    '2016-11-12 04:54:59 NumRegions:7 MaxRegionArea:5'

line =

    '2016-11-12 04:55:31 NumRegions:582 MaxRegionArea:319'

line =

    '2016-11-12 04:55:41 NumRegions:187 MaxRegionArea:315'
```

```
line =

    '2016-11-12 04:56:02 NumRegions:1028 MaxRegionArea:326'


line =

    '2016-11-12 04:56:36 NumRegions:223 MaxRegionArea:482'


line =

    '2016-11-12 04:56:52 NumRegions:59 MaxRegionArea:1121'


line =

    '2016-11-12 04:57:25 NumRegions:323 MaxRegionArea:515'


line =

    '2016-11-12 04:57:34 NumRegions:86 MaxRegionArea:482'


line =

    '2016-11-12 04:57:42 NumRegions:40 MaxRegionArea:47'


line =

    '2016-11-12 04:57:51 NumRegions:492 MaxRegionArea:148'


line =

    '2016-11-12 04:58:07 NumRegions:589 MaxRegionArea:505'


line =

    '2016-11-12 04:58:28 NumRegions:479 MaxRegionArea:305'


line =

    '2016-11-12 04:58:50 NumRegions:292 MaxRegionArea:349'


line =

    '2016-11-12 04:58:59 NumRegions:313 MaxRegionArea:65'
```

```
line =

    '2016-11-12 04:59:07 NumRegions:351 MaxRegionArea:42'


line =

    '2016-11-12 04:59:16 NumRegions:26 MaxRegionArea:582'


line =

    '2016-11-12 04:59:28 NumRegions:245 MaxRegionArea:129'


line =

    '2016-11-12 04:59:38 NumRegions:771 MaxRegionArea:1210'


line =

    '2016-11-12 05:00:40 NumRegions:311 MaxRegionArea:2658'


line =

    '2016-11-12 05:00:49 NumRegions:325 MaxRegionArea:68'


line =

    '2016-11-12 05:01:03 NumRegions:598 MaxRegionArea:318'


line =

    '2016-11-12 05:01:48 NumRegions:145 MaxRegionArea:681'


line =

    '2016-11-12 05:02:08 NumRegions:527 MaxRegionArea:15164'


line =

    '2016-11-12 05:02:17 NumRegions:248 MaxRegionArea:2174'


line =

    '2016-11-12 05:02:44 NumRegions:33 MaxRegionArea:4347'
```

```
line =

    '2016-11-12 05:03:05 NumRegions:25 MaxRegionArea:7167'


line =

    '2016-11-12 05:03:27 NumRegions:6 MaxRegionArea:15417'


line =

    '2016-11-12 05:03:35 NumRegions:8 MaxRegionArea:16023'


line =

    '2016-11-12 05:03:58 NumRegions:144 MaxRegionArea:175'


line =

    '2016-11-12 05:04:09 NumRegions:3 MaxRegionArea:93'


line =

    '2016-11-12 05:04:29 NumRegions:20 MaxRegionArea:13'


line =

    '2016-11-12 05:04:37 NumRegions:7 MaxRegionArea:29'


line =

    '2016-11-12 05:04:53 NumRegions:103 MaxRegionArea:2647'


line =

    '2016-11-12 05:05:02 NumRegions:10 MaxRegionArea:9450'


line =

    '2016-11-12 05:05:15 NumRegions:129 MaxRegionArea:2300'


line =

    '2016-11-12 05:05:26 NumRegions:44 MaxRegionArea:484'

Summary:
 Missing: 1
```

```
Processed: 80
MissingOne: 0
```

```
    else
        if exist(filename_flash, 'file') == 2 || exist(filename_noflash, 'file') == 2
            num_onlyOne = num_onlyOne+1;
        end
        num_missing = num_missing+1;
        cd ~/Box' Sync'/School/Graduate/CS229/Project/imagepreprocessing
        fprintf('Could not find an image file');
    end



end


fprintf('Summary: \r\n Missing: %d \r\n Processed: %d \r\n MissingOne: %d \r\n',num_missing,num
```

```
Could not find an image file
```

Published with MATLAB® 7.14