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BME 4783 - Medical Imaging Modalities

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```
%function [] = IterativeFiltration(filename, nhood, filterCycles, gray2bin)

tic
clear all
clc
```

File loading

Load an Image into a matrix I.

```
sample = imread('overconfluent.tif');
%sample = imread(filename);
originalSample = sample;

% Convert the Image to grayscale.
%sample = rgb2gray(sample);

%% Conditioning parameters.
% Pixel Neighborhood Size for median filter.
nhood = [1 1]; % Note: change each iteration?
% No. times we will median and adaptive histogram filter succesively.
filterCycles = 2;
% Binary thresholding of the grayscale image.
gray2bin = 110;

% Perform the double filtration filterCycles times.
for cycle = 1:filterCycles
    disp(cycle)
    % Apply Median Filtration pixel-wise in a n'hood of dim nhood.
    medFiltLast = medfilt2(sample, nhood);
    % Apply Adaptive Histogram Equalization.
    adaptHistEqLast = adapthisteq(medFiltLast);
    % Set the twice filtered image to be equal to the sample.
    sample = adaptHistEqLast;
end

% Create a black and white image from the grayscale image.
binSample = sample > gray2bin;

% Median Filter the BinSample to remove speckling.
```

```
binSampleFiltered = medfilt2(binSample, nhood);  
binSampleFiltered = ~binSampleFiltered;
```

1

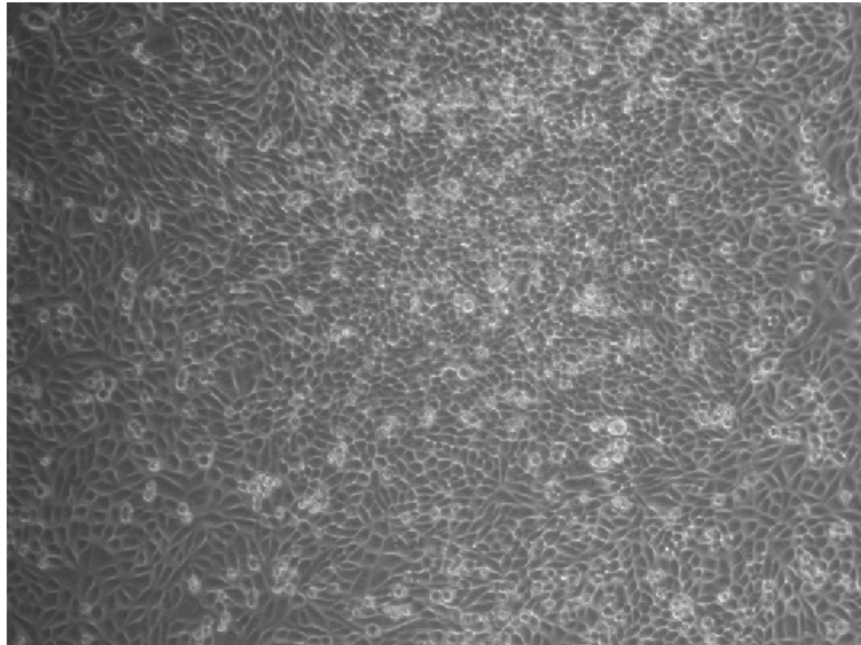
2

Image Display and Visualization

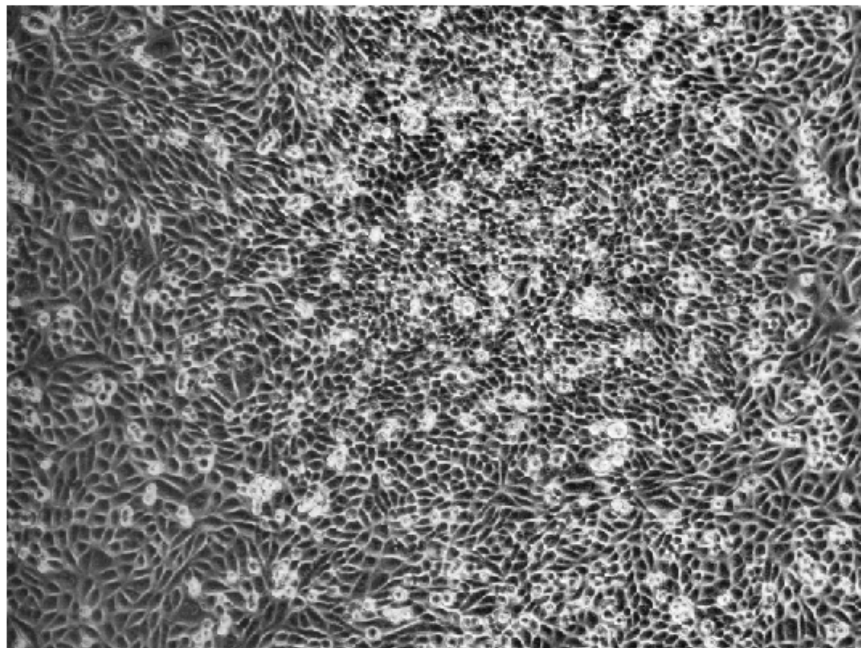
```
figure(1)  
imshow(originalSample)  
title('Original Image')  
  
figure(2)  
imshow(medFiltLast)  
title('Final Median Filtered Picture')  
  
figure(3)  
imshow(adaptHistEqLast)  
title('Final Adaptive Histogram Equalization Picture')  
  
figure(4)  
imshow(binSample);  
title('Filtered Image with Binary Thresholding Applied')  
  
figure(5)  
imshow(binSampleFiltered);  
title('Filtered Image with Binary Thresholding Applied')
```

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

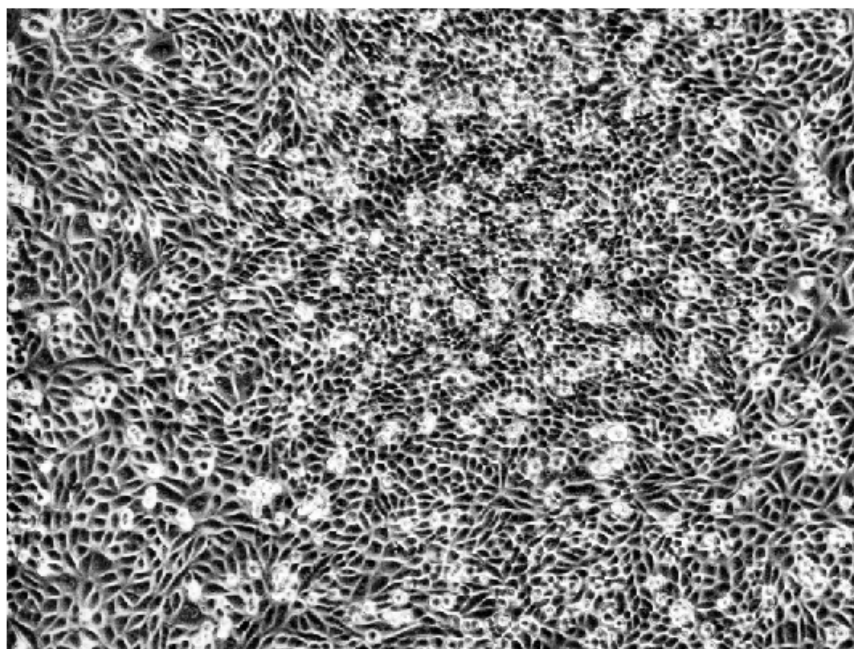
Original Image



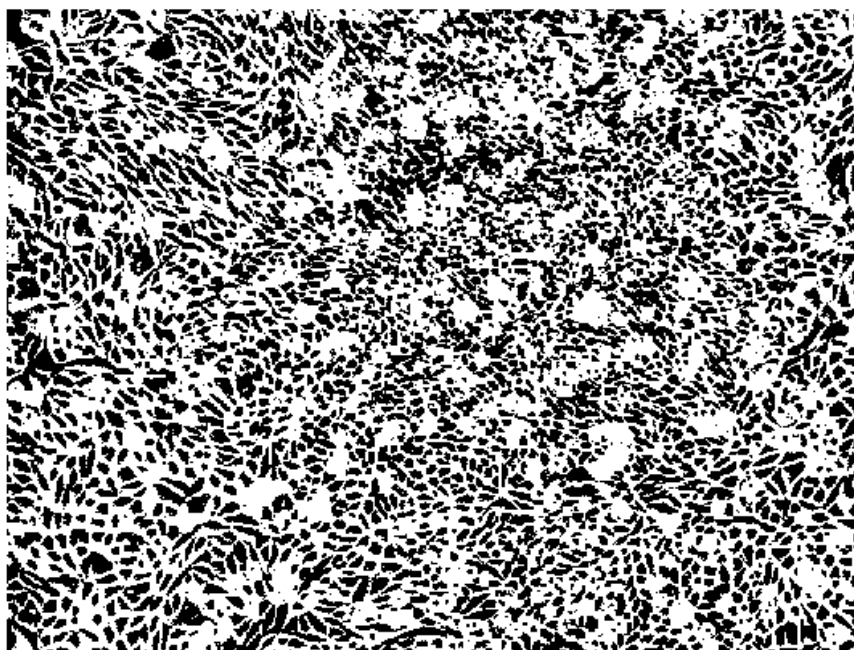
Final Median Filtered Picture



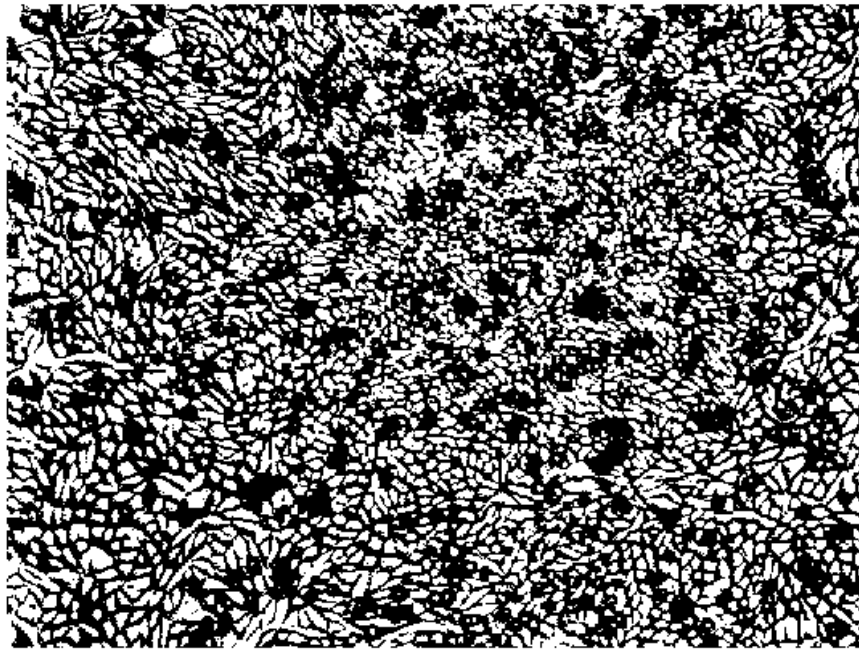
Final Adaptive Histogram Equalization Picture



Filtered Image with Binary Thresholding Applied



Filtered Image with Binary Thresholding Applied



Perform the Cell Counting.

```
figure(6)
%B = bwboundaries(binSampleFiltered);
B = bwboundaries(binSampleFiltered, 'noholes');
imshow(originalSample)
title('Original Image with "Found Cells" Overlaid from overconfluent.tif ');
text(10,10, strcat('\color{blue}Objects Found:', num2str(length(B))))
hold on

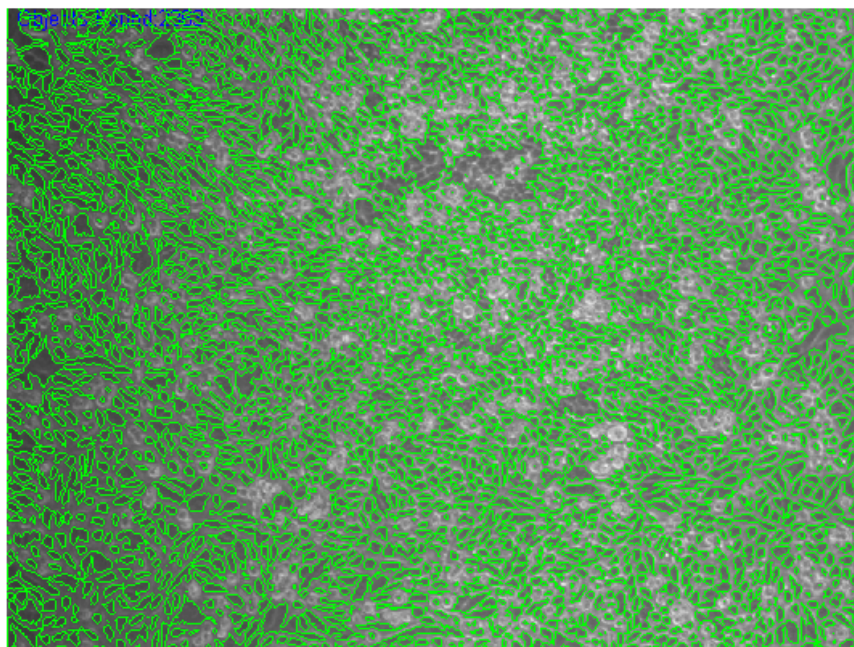
for k = 1:length(B)
    boundary = B{k};
    plot(boundary(:,2), boundary(:,1), 'g', 'LineWidth', 0.4)
end

toc

%end
```

*Warning: Image is too big to fit on screen; displaying at 67%
Elapsed time is 12.055748 seconds.*

Original Image with "Found Cells" Overlaid from overconfluent.tif



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