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%Pratap Luitel
%ENGS 111
%HW 4
%Part 3

im1 = imread('rice.png');
[i2,m2] = imread('son1-1.gif');

%convert to type double
imIn1 = im2double(im1);
imIn2 = ind2gray(i2,m2);
imIn2 = im2double(imIn2);

imageSequence1 = zeros(size(imIn1,1),size(imIn1,2),1,3);
imageSequence2 = zeros(size(imIn2,1),size(imIn2,2),1,3);

n = [15 5];
%SE - for rice
startX = floor(n(1)/2);
x = repmat(-startX:startX,[n(1) 1]);
y = repmat([-startX:startX]',[1 n(1)]);
r = sqrt(x.^2 + y.^2);
SE1 = zeros(n(1),n(1));
SE1(r <= startX) = 1;

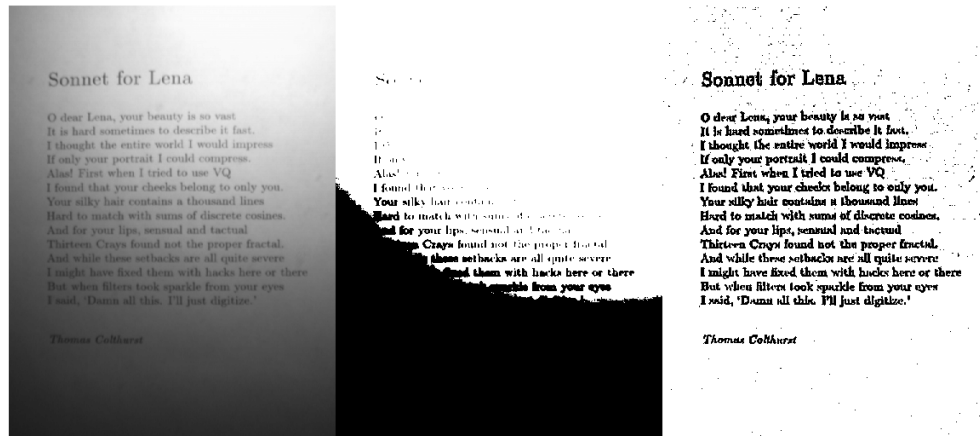
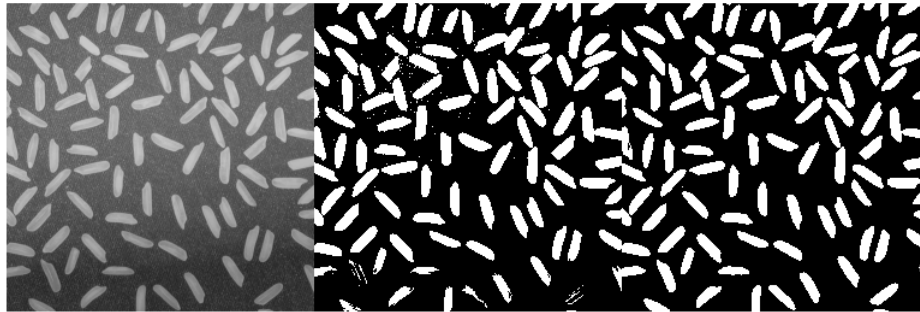
%SE - for son1-1.gif
startX = floor(n(2)/2);
x = repmat(-startX:startX,[n(2) 1]);
y = repmat([-startX:startX]',[1 n(2)]);
r = sqrt(x.^2 + y.^2);
SE2 = zeros(n(2),n(2));
SE2(r <= startX) = 1;

%rice.png
imageSequence1(:,:,1,1) = imIn1;
%threshold without top hat filtering
imageSequence1(:,:,1,2) = im2bw(imIn1,0.5);
%threshold after top hat filtering
tempImIn1 = topBottomHat(imIn1,SE1,1);
imageSequence1(:,:,1,3) = im2bw(tempImIn1,0.2);

%son1-1.gif
imageSequence2(:,:,1,1) = imIn2;
%threshold without bottom hat filtering
imageSequence2(:,:,1,2) = im2bw(imIn2,0.4);
%threshold after bottom hat filtering
tempImIn2 = topBottomHat(imIn2,SE2,0);
imageSequence2(:,:,1,3) = ~im2bw(tempImIn2,0.015);
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figure(1)
montage(imageSequence1,'size',[1,3]);
figure(2)
montage(imageSequence2,'size',[1 3]);
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