

INF 3300, INF4300 Week 36 exercise solution

Niblack's method

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Niblack's method, remember...

1. Simple and efficient method for adaptive thresholding
2. The local threshold is set at:

$$t(i, j) = \mu(i, j) + w\sigma(i, j)$$

Niblack's method, remember...

1. The values for local mean and standard deviation is calculated over a local $M \times N$ window.
2. The parameters are the weight w and the window size.

Niblack's method, Matlab implementation

```
% Niblack's method

% Prepare

clear all
close all

% Read image, convert to graylevels
% and show histogram

i=imread('francis.jpg');
i=double(rgb2gray(i));
figure;
imshow(i,[0 255])

% Calculate histogram and plot

figure
ih=histc(i(1:prod(size(i))),0:255);
bar(ih)
```

```
% Select filter size, this works fairly
% well

N=31;

% Calculate local means and variance, this
% is a neat trick in Matlab

localMean = filter2(ones(N), i) / (N*N);
localVar = filter2(ones(N), i.^2) / (N*N);
localMean.^2;
localStd=sqrt(localVar);

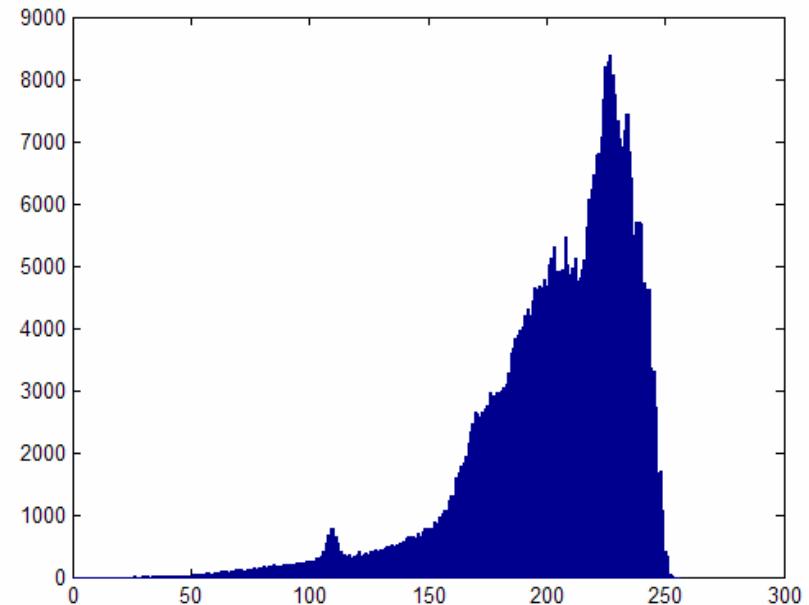
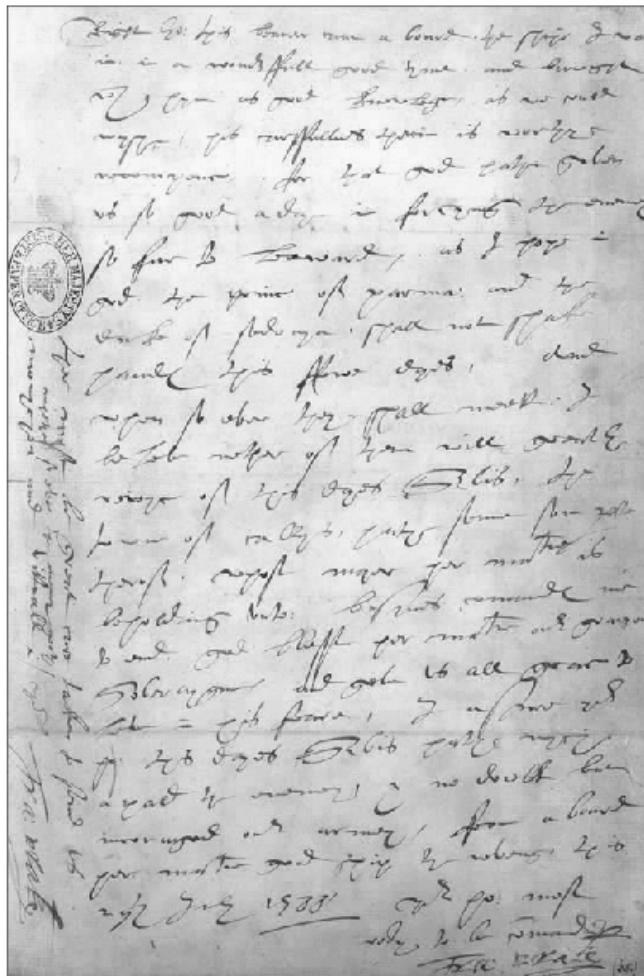
% Here goes the magick

weight=-0.8;
t=localMean+weight*localStd;

% Display different results

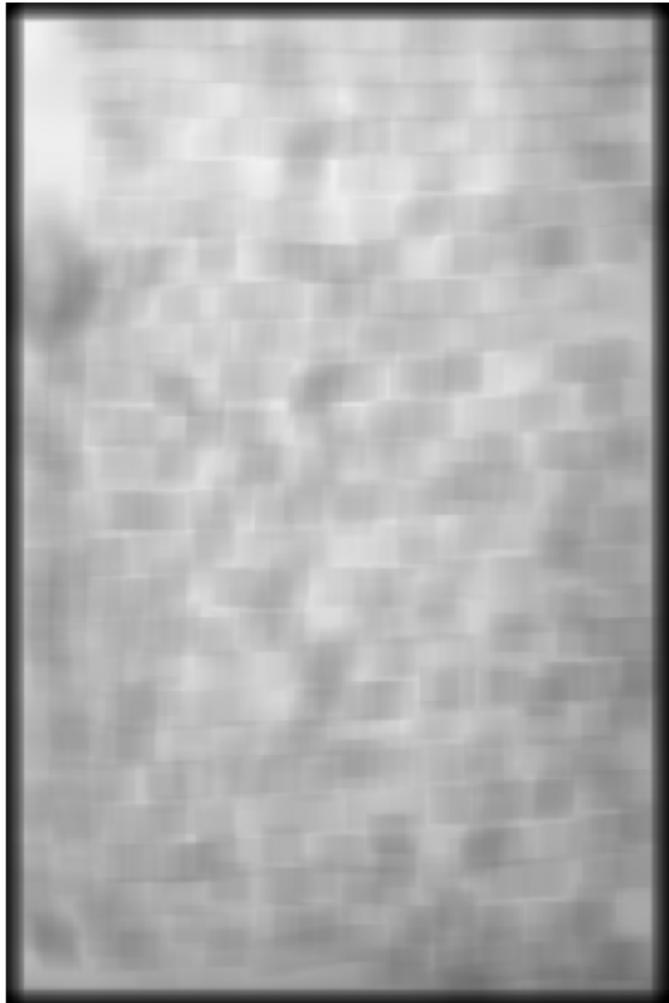
figure
imshow(t,[0 255])
it=i<t;
figure
imshow(it,[0 1])
```

Niblack's method, original image and histogram



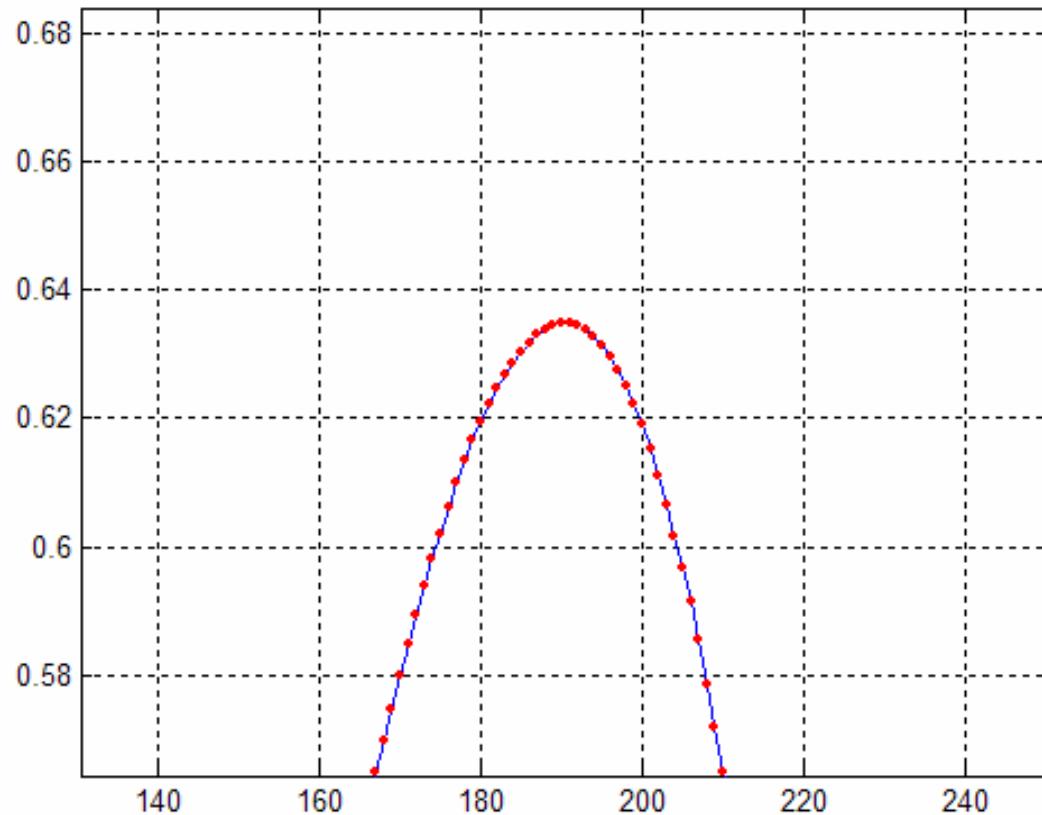
No evident way to place the threshold

Niblack's method, local values and result



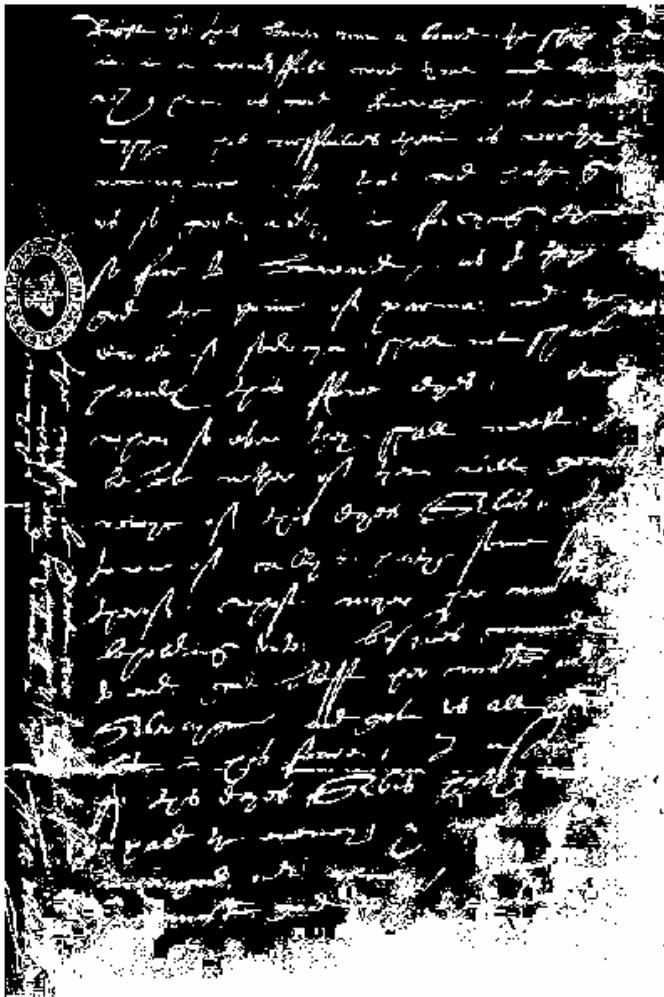
On the 20th there was a meeting for the Dr.
in a small field over here we know
as "The Green" about three acres, at noon with
you & Mr. Miller you it worked
out your gift for me today. After
it I got a box, it was to me,
a book "Hawthorne" & I thought
at to give up government & take
out of the 2nd year & go to Boston
and get a few days of work
over to him for the next 2nd
to the major of you will want
now if we go to Boston for 2nd
but I only to take from the 2nd
book & paper money for my self &
by doing little by little come in
but the diff for master & you
is all the cost is all gone &
there is no more, I am now 28
of 2nd day of October & I am going
to go to school in South Ber-
keley or some place for a short
time and try to get along to do
the 2nd day 1838 & go on
the 2nd day 1838

Otsu's method, η vector at peak



Peak at 190

Otsu's method, threshold result at maximum η value



No global threshold will solve this problem