

Local Enhancement

- Local Enhancement
- HW2 due Oct 9
- Required Reading: Sections 3.1 – 3.3
- Project groups: need to finalize soon (tomorrow?)

Local enhancement



Sometimes Local Enhancement is Preferred.

Malab: BlkProc operation for block processing.

Left: original “tire” image.

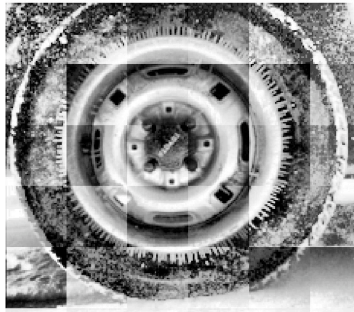
Histogram equalized



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Local histogram equalized



```
F=@ histeq;  
I=imread('tire.tif');  
J=blkproc(I,[20 20], F);
```

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Fig 3.23: Another example

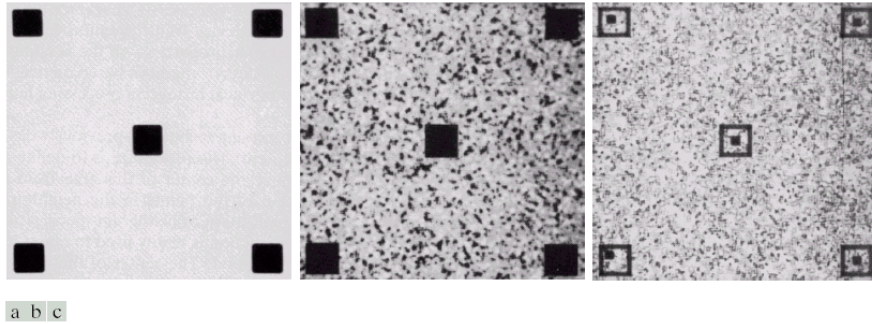


FIGURE 3.23 (a) Original image. (b) Result of global histogram equalization. (c) Result of local histogram equalization using a 7×7 neighborhood about each pixel.

Local Contrast Enhancement

- Enhancing local contrast

$$g(x,y) = A(x,y) [f(x,y) - m(x,y)] + m(x,y)$$

$$A(x,y) = k M / \sigma(x,y) \quad 0 < k < 1$$

M : Global mean

m(x,y), $\sigma(x,y)$: Local mean and standard dev.

Areas with low contrast \rightarrow Larger gain A(x,y)

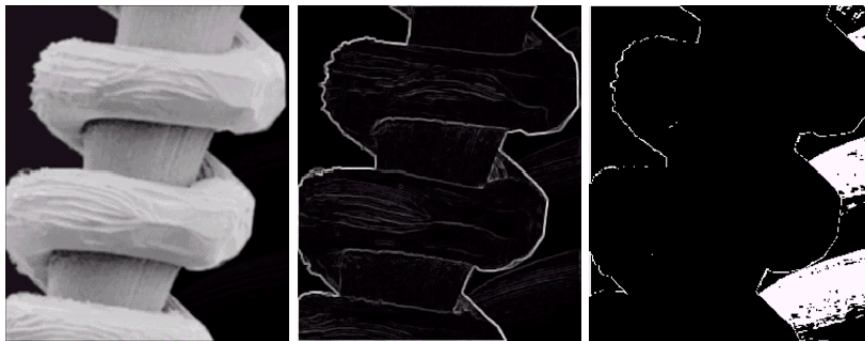
Fig 3.27

FIGURE 3.24 SEM image of a tungsten filament and support, magnified approximately 130 \times . (Original image courtesy of Mr. Michael Shaffer, Department of Geological Sciences, University of Oregon, Eugene).



Figure numbers refer to the second edition.

Fig 3.25



a b c

FIGURE 3.25 (a) Image formed from all local means obtained from Fig. 3.24 using Eq. (3.3-21). (b) Image formed from all local standard deviations obtained from Fig. 3.24 using Eq. (3.3-22). (c) Image formed from all multiplication constants used to produce the enhanced image shown in Fig. 3.26.

Figure numbers refer to the second edition

Fig 3.26



FIGURE 3.26
Enhanced SEM
image. Compare
with Fig. 3.24. Note
in particular the
enhanced area on
the right side of
the image.

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Image Subtraction

$$g(x,y) = f(x,y) - h(x,y)$$

$h(x,y)$ —a low pass filtered version of $f(x,y)$.

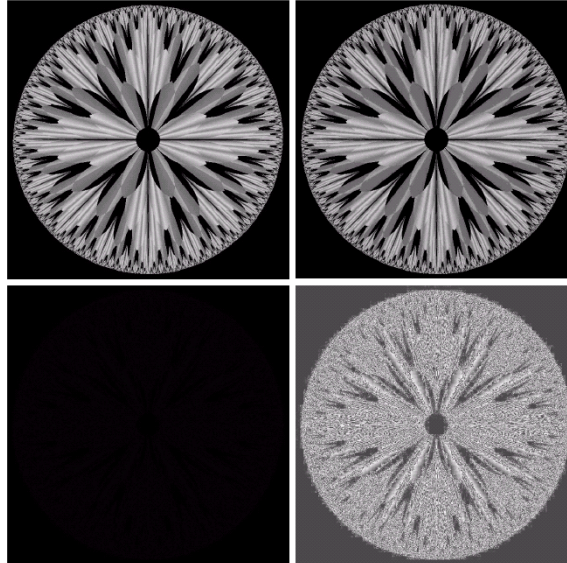
- Application in medical imaging --“mask mode radiography”
- $H(x,y)$ is the mask, e.g., an X-ray image of part of a body; $f(x,y)$ —incoming image after injecting a contrast medium.

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Subtraction: an example

a b
c d

FIGURE 3.28
(a) Original fractal image.
(b) Result of setting the four lower-order bit planes to zero.
(c) Difference between (a) and (b).
(d) Histogram-equalized difference image. (Original image courtesy of Ms. Melissa D. Binde, Swarthmore College, Swarthmore, PA).



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Fig 3.28: mask mode radiography

a b

FIGURE 3.29
Enhancement by image subtraction.
(a) Mask image.
(b) An image (taken after injection of a contrast medium into the bloodstream) with mask subtracted out.

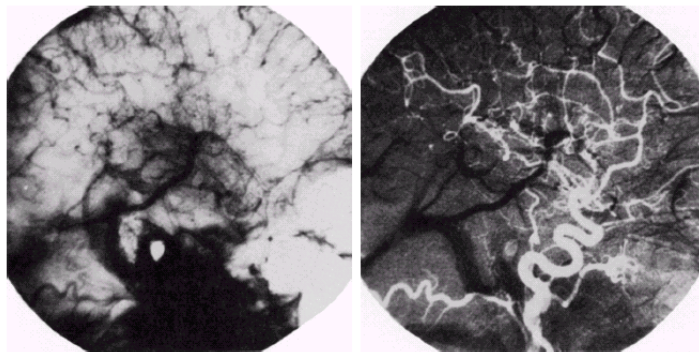


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