Contrast Enhancement

L19

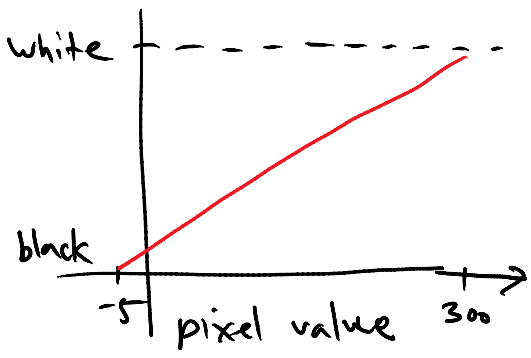
Goal: To create a clear understanding of how we can map image intensities to screen brightness.

Contrast/Brightness

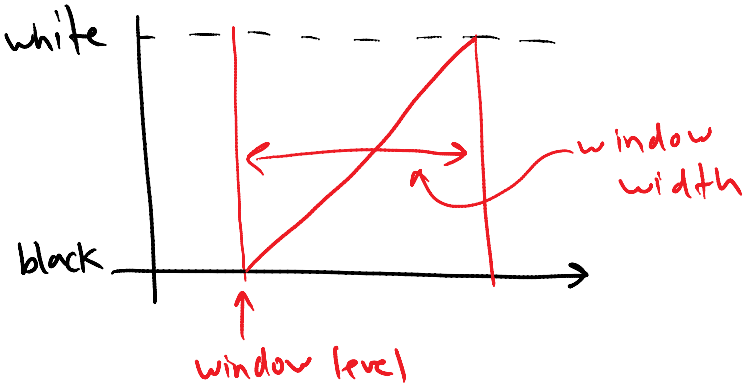
You have a choice of how to map image intensities to screen graylevels. Matlab, by default, maps min to black and max to white.

eg. min intensity = -5

max intensity = 300



In radiology circles, they often refer to this mapping as **"window width"** and **"window level"**.



(ImageJ demo)

This is helpful to see structures that have similar intensities in an image that has a large intensity range.

Gamma Correction

A common way to map the image intensities is called gamma correction.

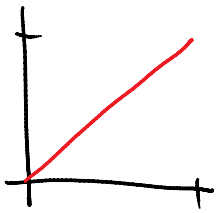
Given intensity f, remap to get g

$$g = f^{\gamma}$$ ← gamma value

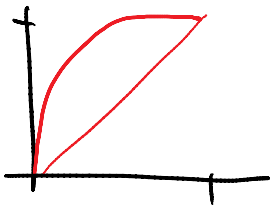
Examples:

$\gamma = \frac{1}{2}$

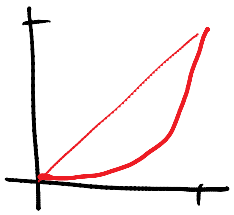
$\gamma = 1$



$\gamma = \frac{1}{10}$



$\gamma = 3$

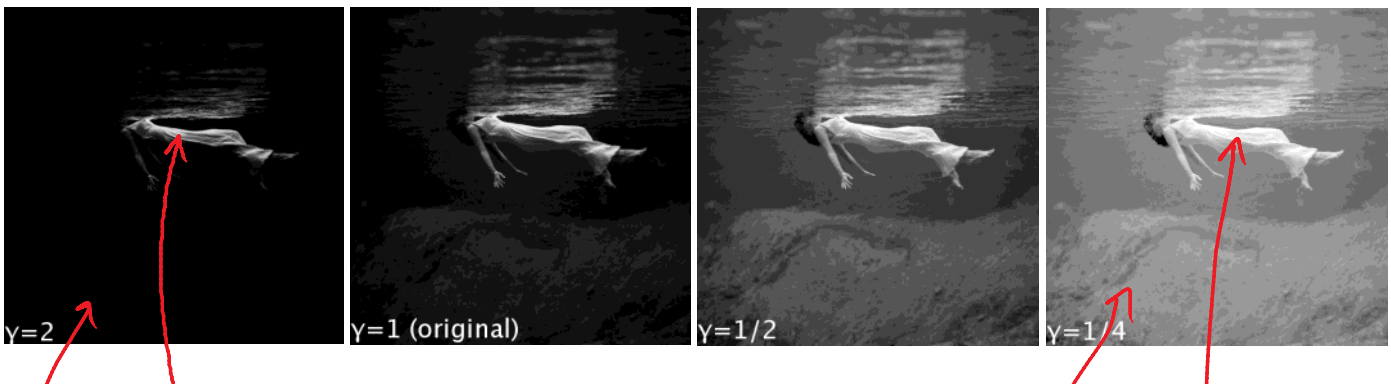


Effect:

$\gamma = \frac{1}{2}$ Enhances dark contrast at cost of bright contrast

$\gamma = 2$ Enhances bright contrast at cost of dark contrast

http://en.wikipedia.org/wiki/File:GammaCorrection_demo.jpg



Better contrast in dress

No background contrast

Not much contrast on dress

But can make out background now.

END