Image Contrast Adjustment

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1. Original image (no stretch)

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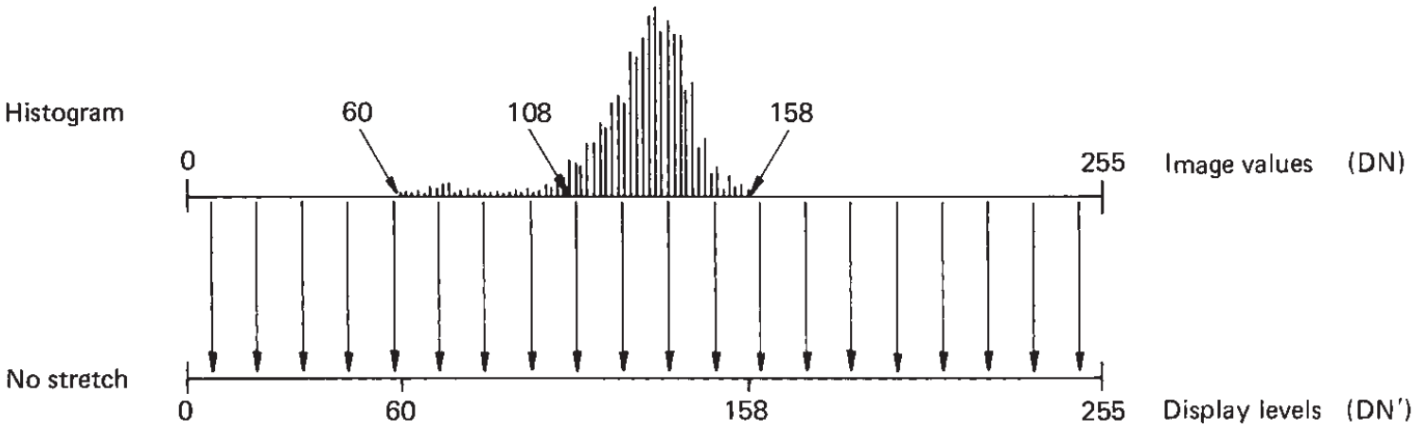
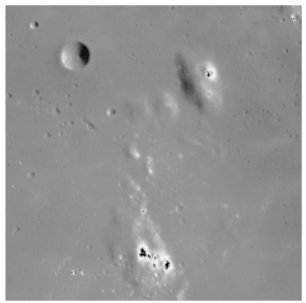
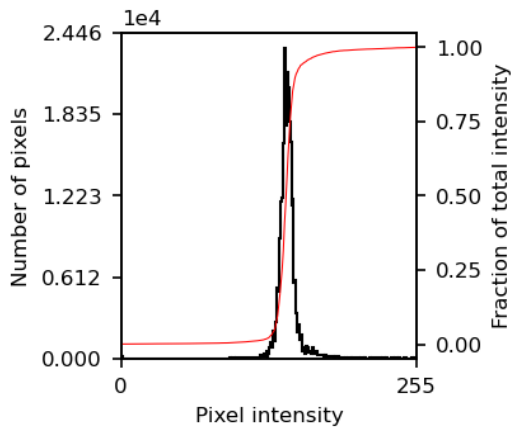
⇨ image pixel brightness values are limited to the range 60 to 158
⇨ without stretch only a small portion of the full range of possible display levels is used
⇨ results in a low contrast image



No strech (low contrast image)

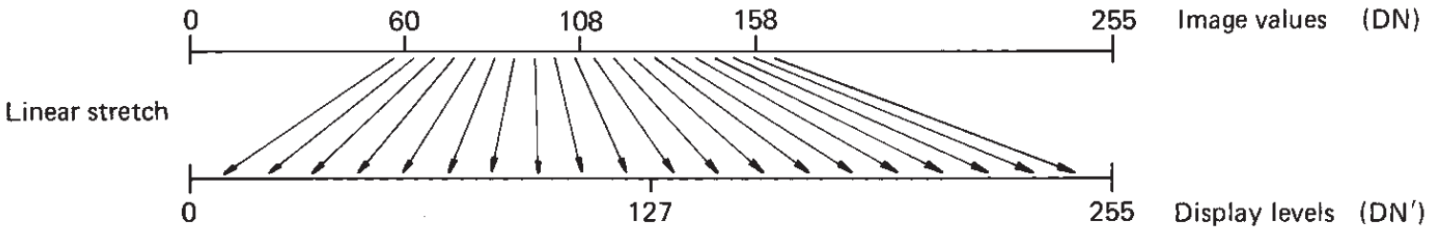




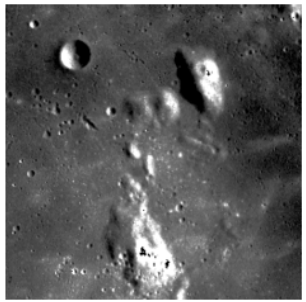
DN = digital number, also referred to as "pixel intensity", "pixel value", or "brightness value"

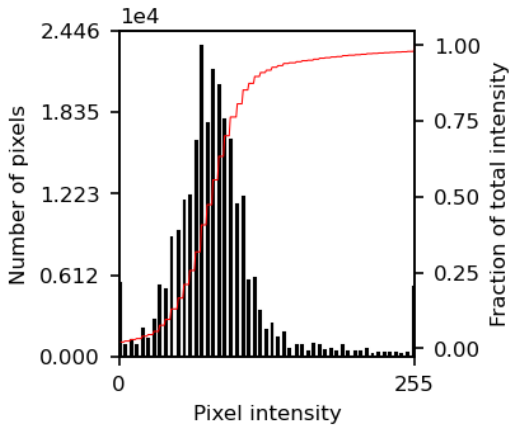
Linear histogram stretch

⇨ expand the range of image levels present in the scene (60 to 158) to fill the range of display values (0 to 255)



Linear stretch (10-90 percentiles)






```
from skimage import exposure
img_rescale = exposure.rescale_intensity(img, in_range='image') # min/max

p2, p98 = np.percentile(img, (2, 98))  # 2-98 percentile
img_rescale = exposure.rescale_intensity(img, in_range=(p2, p98))
```

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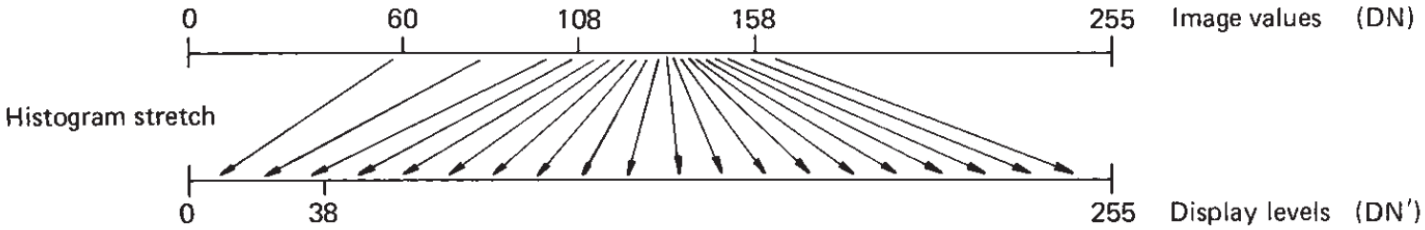
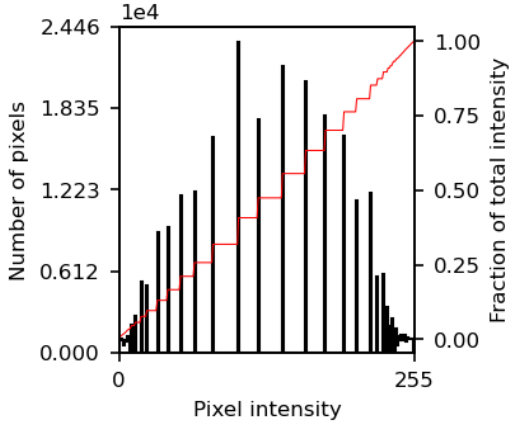
Histogram equalization

⇨ expand image pixel values on the basis of their frequency of occurrence
= spread out the most frequent intensity values



Histogram stretch (equalization)




```
from skimage import exposure
img_eq = exposure.equalize_hist(img)
```

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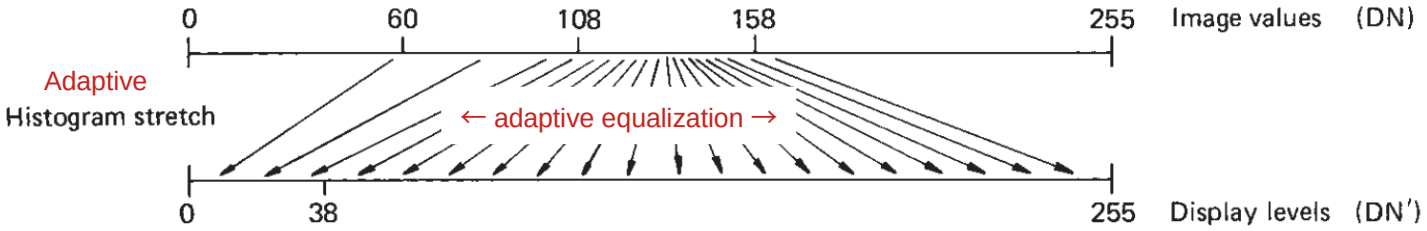
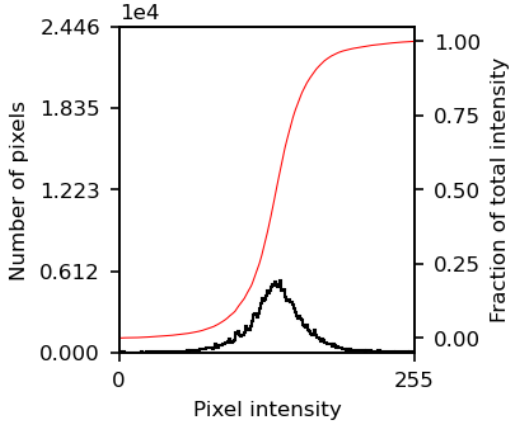
4. Adaptive histogram equalization

Adaptive histogram equalization

⇨ algorithm "*Contrast Limited Adaptive Histogram Equalization*" (CLAHE)
⇨ computes histograms over different regions of the image for local contrast enhancement
⇨ local details can be enhanced even in regions that are darker or lighter than most of the image




```
from skimage import exposure
img_adapteq = exposure.equalize_adapthist(img)
```



DN = digital number, also referred to as "pixel intensity", "pixel value", or "brightness value"