Histogram equalization for discrete case

- Now, f only assumes discrete amplitude values $f_0, f_1, \cdots, f_{L-1}$ with empirical probabilities

$$P_0 = \frac{n_0}{n} \qquad P_1 = \frac{n_1}{n} \qquad \cdots \qquad P_{L-1} = \frac{n_{L-1}}{n} \qquad \text{where } n = \sum_{l=0}^{L-1} n_l$$

pixel count for amplitude f_l

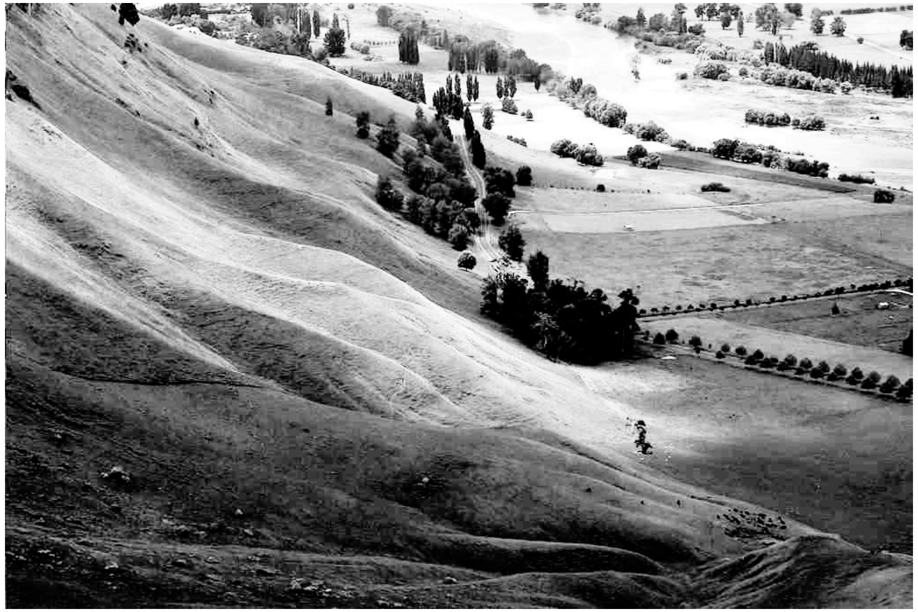
- Discrete approximation of $g = T(f) = \int_0^f p_f(\alpha)\, d\alpha$

$$g_k = T[f_k] = \sum_{i=0}^{k} P_i \qquad \text{for } k = 0, 1 \ldots, L-1$$

- The resulting values g_k are in the range $[0,1]$ and might have to be scaled and rounded appropriately.

Histogram equalization example

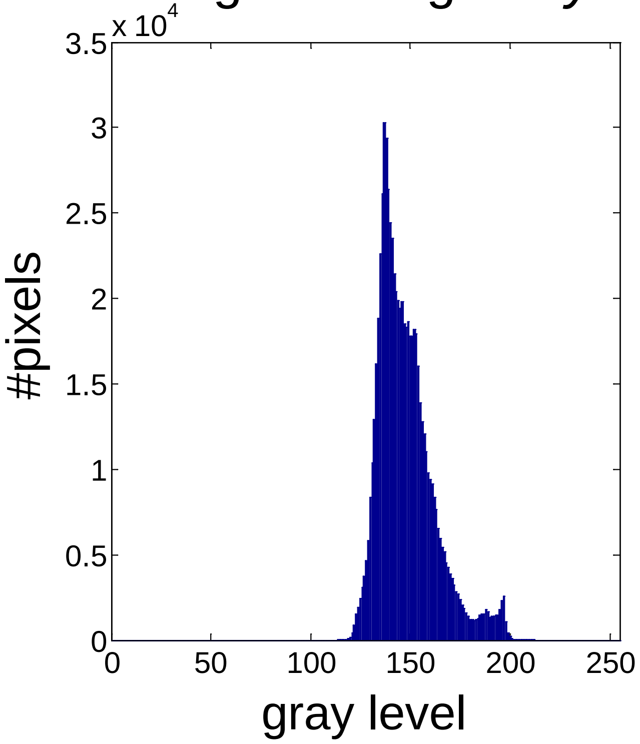
Original image *Bay*

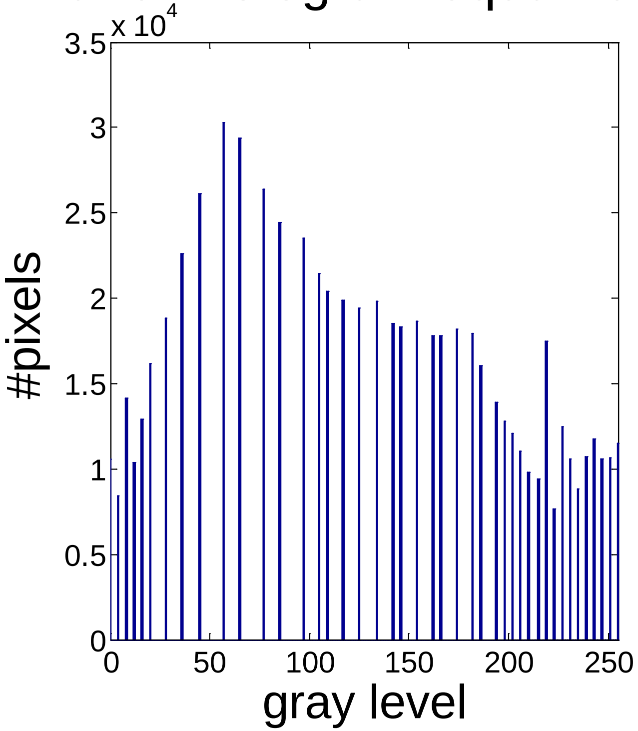


... after histogram equalization

Histogram equalization example

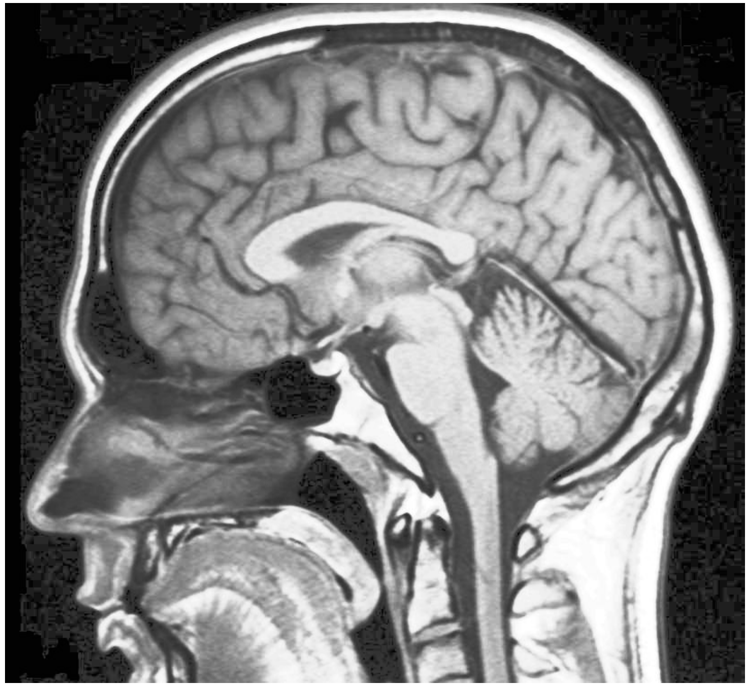
Original image *Bay* . . . after histogram equalization





Histogram equalization example

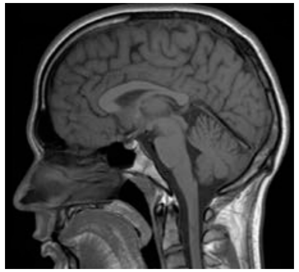
Original image *Brain*

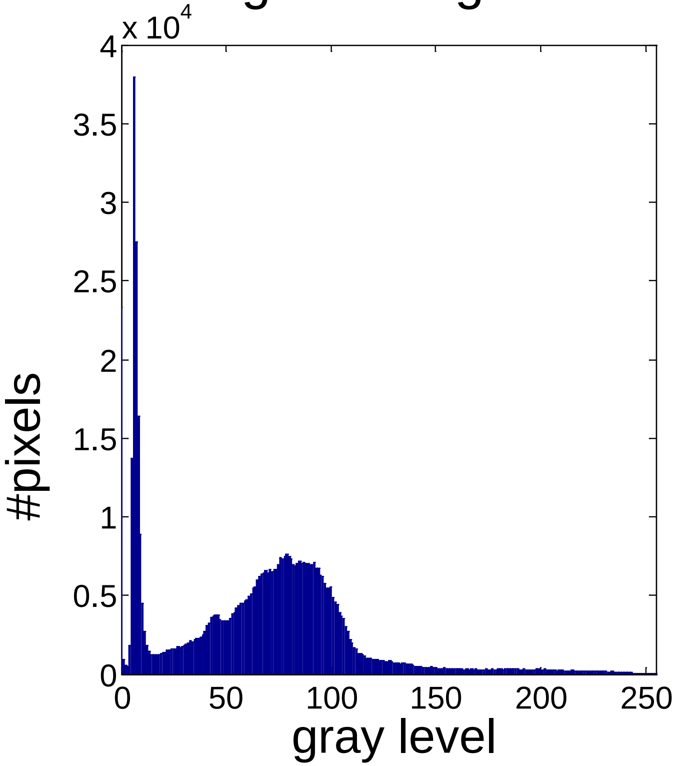


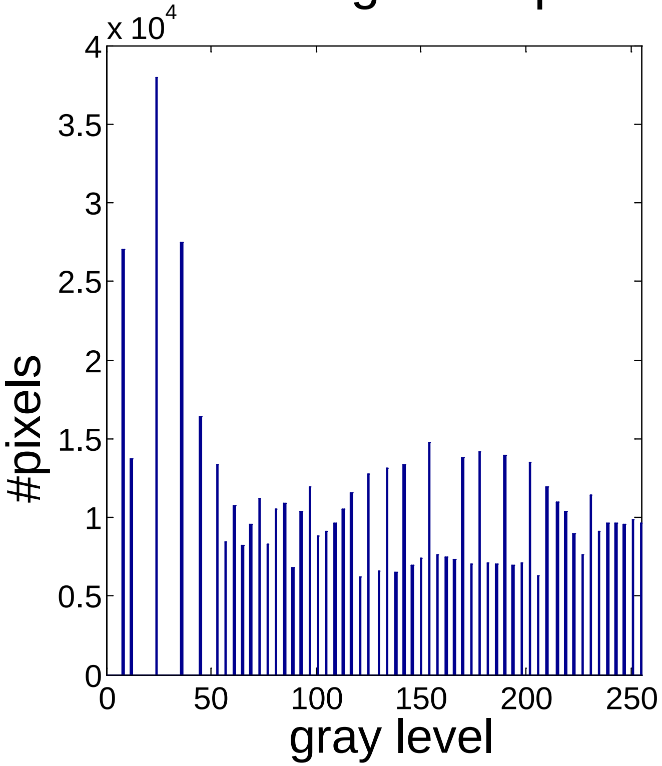
... after histogram equalization

Histogram equalization example

Original image *Brain* . . . after histogram equalization

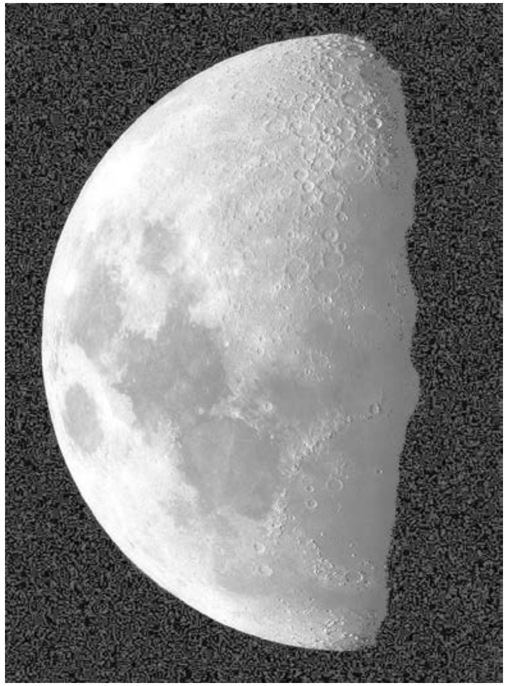






Histogram equalization example

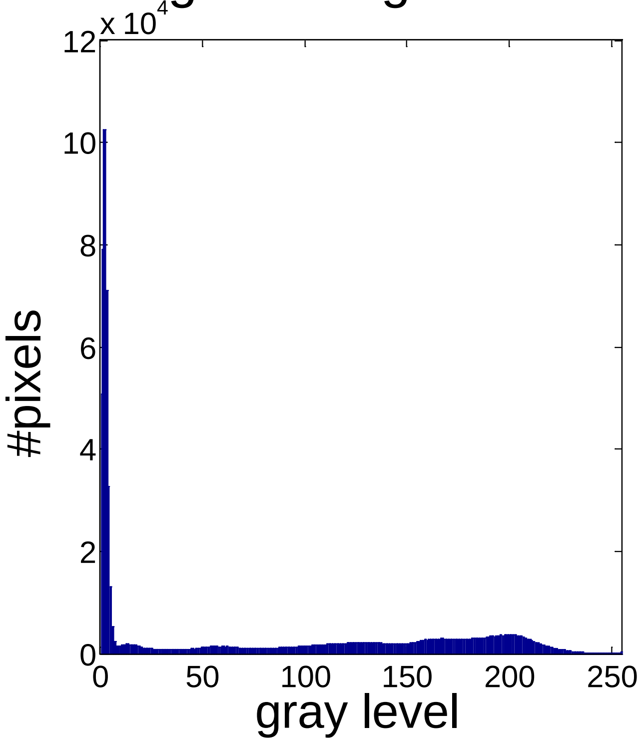
Original image *Moon*



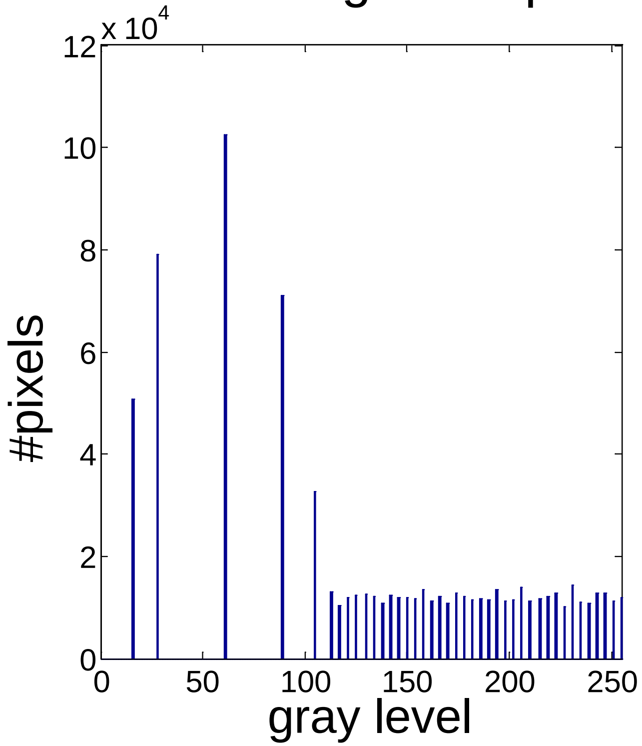
... after histogram equalization

Histogram equalization example

Original image *Moon*



. . . after histogram equalization



Contrast-limited histogram equalization