6 Point Operators

4. image described by a histogram

a) point operators construct a New image from an OLD, point by point

$$N_{x,y} = f(O_{x,y})$$

e.g. $= -O_{x,y}$ (brightness inversion)

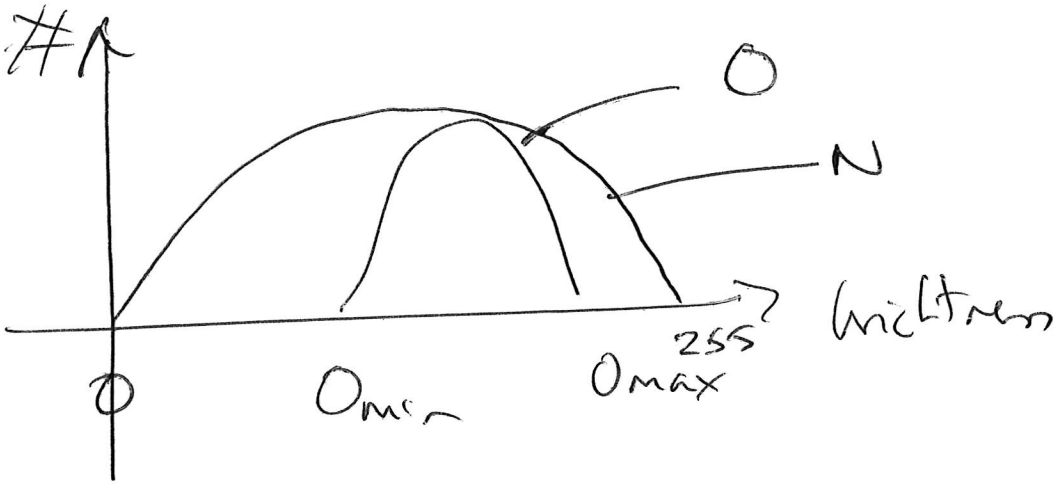
$= g \times O_{x,y} + b$

gain, level

$= \log(O_{x,y})$ (used in Fourier)

need automatic methods

iii). intensity normalization



$$range = \frac{255}{O_{max} - O_{min}}$$

$$N_{x,y} = range \times (O_{x,y} - O_{min})$$

IV. histogram equalisation

used for displaying images
good for human vision
aim: is for a uniformly flat histogram.

for an N×N image

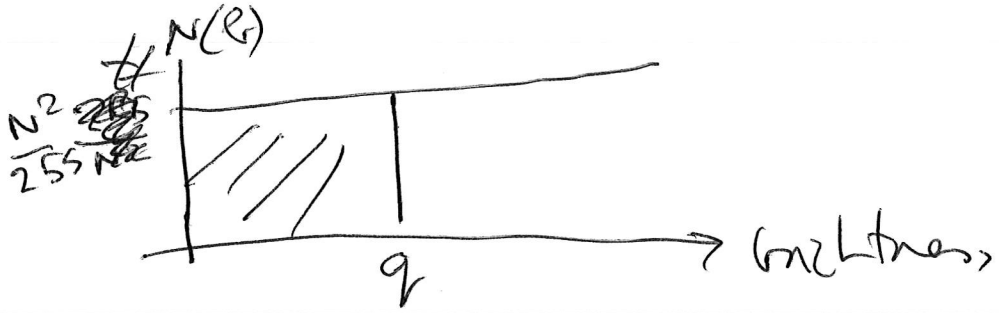
points in New = # points in Old

" " " " up to level q = " " " " up to level p

$$\sum_{r=0}^{q} N(r) = \sum_{r=0}^{p} O(r)$$

↑ # points ↑ level

aim



$$\frac{N^2}{255} \times q = \sum_{r=0}^{p} O(r)$$

$$q = \frac{255}{N^2} \times \sum_{v=0}^{p} O(q).$$

target is a uniformly flat image

so this gives an equalising function

$$N_{x,y} = E(q, O)$$

v). thresholding -

$$N_{x,y} = \begin{cases} 1 & O_{x,y} \geq \text{threshold} \\ 0 & \text{otherwise} \end{cases}$$

many variants