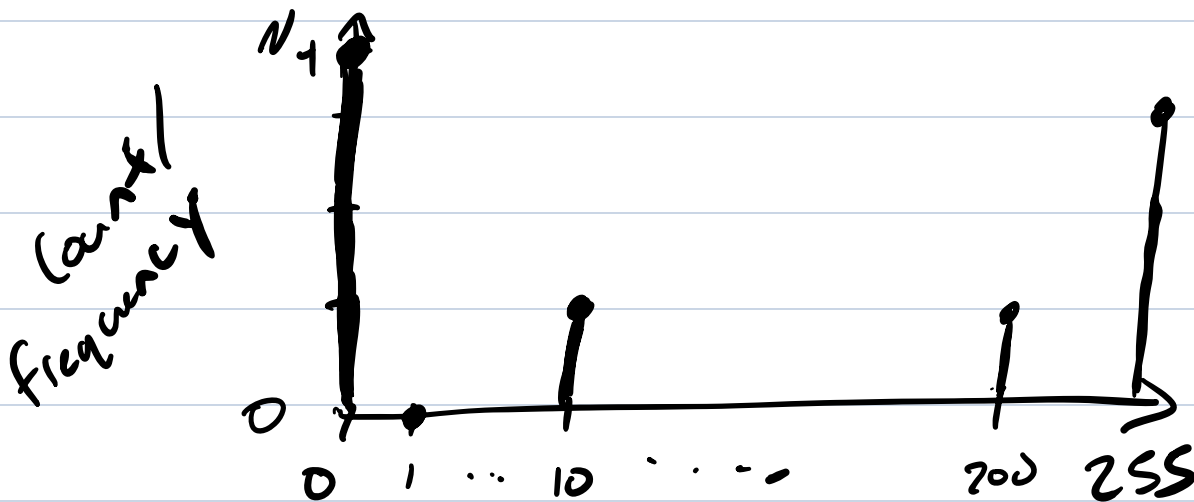


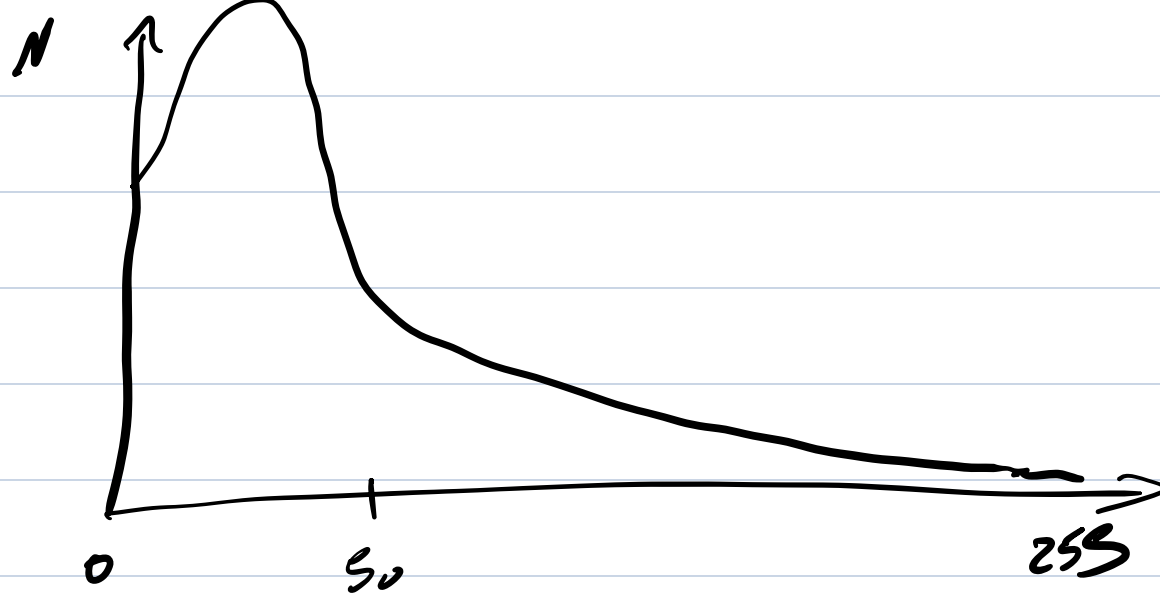
Histogram / Equalization

- grayscale image \rightarrow representation of the amount of light / intensity of an image

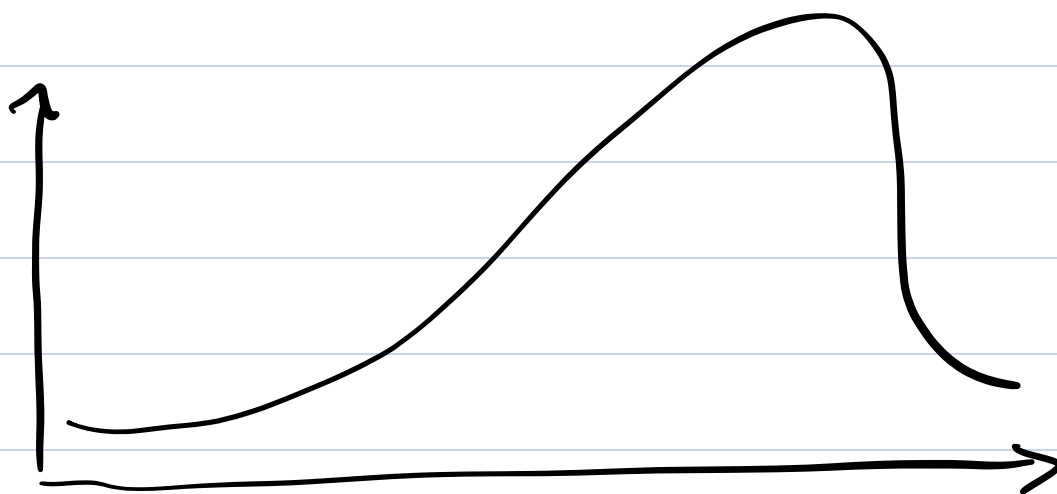
- Histogram is a chart that shows the frequency of a certain value showing up in an image



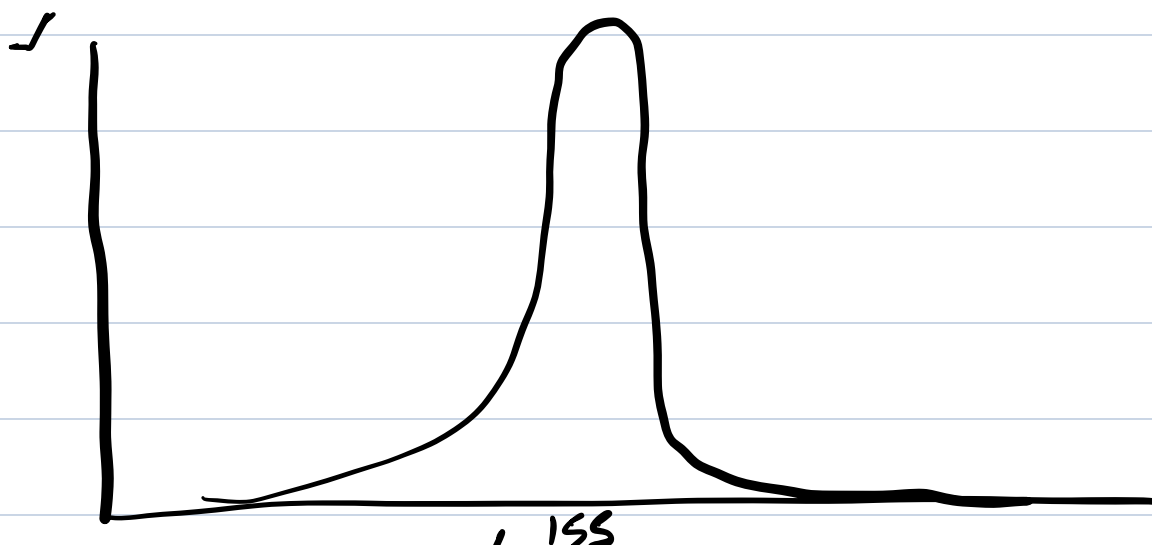
0	0	0
10	0	200
255	255	255



- its going to be a dark image

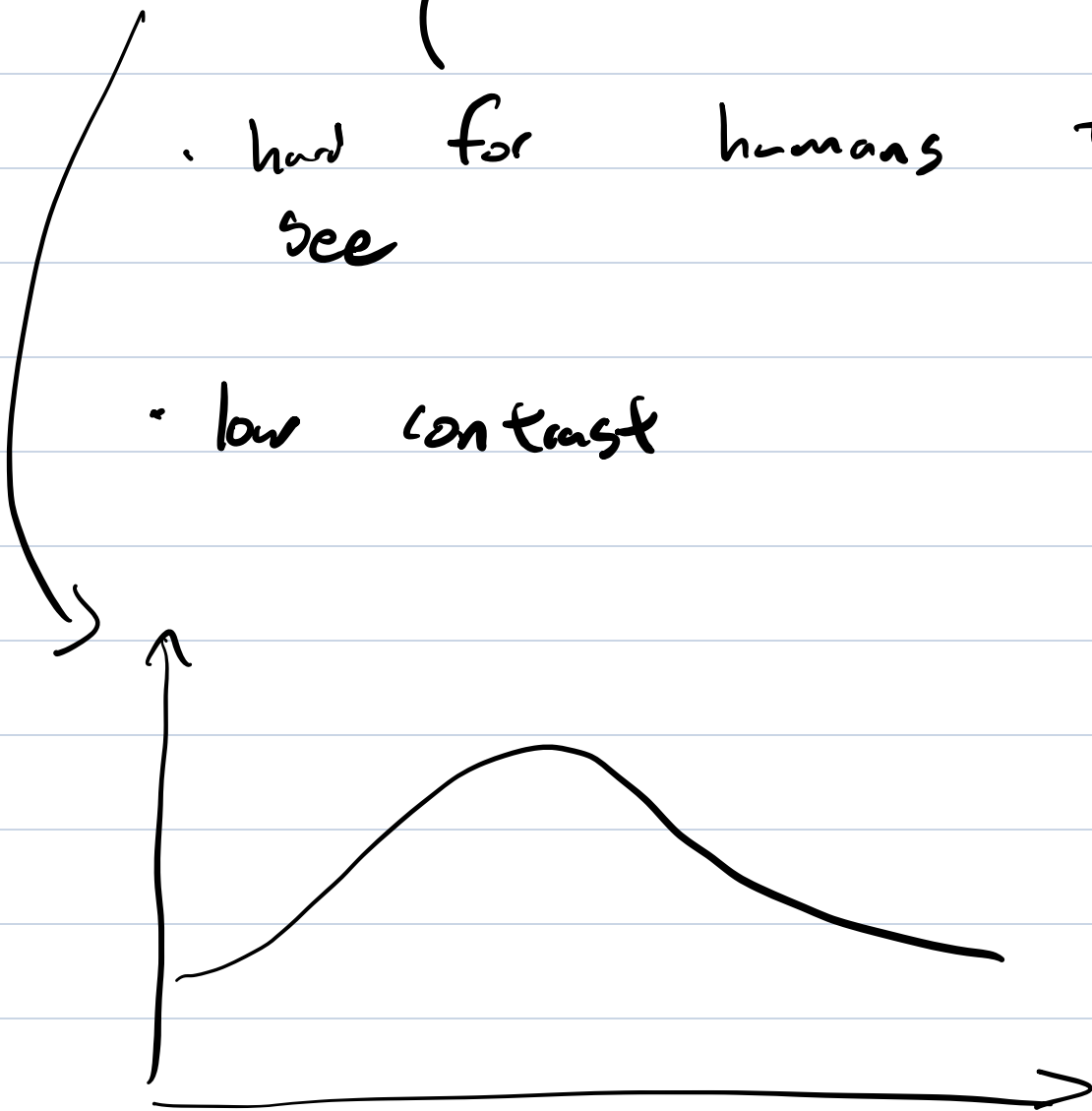


- light image



• hard for humans to see

• low contrast

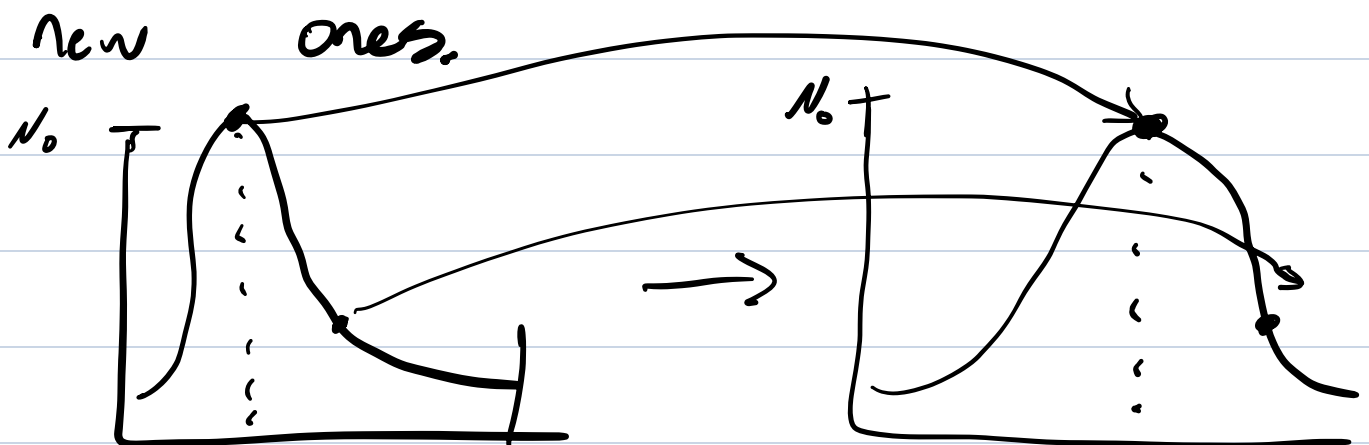


• flatten out

• more contrast

• we can map old values to

new ones.



50

155

155

255

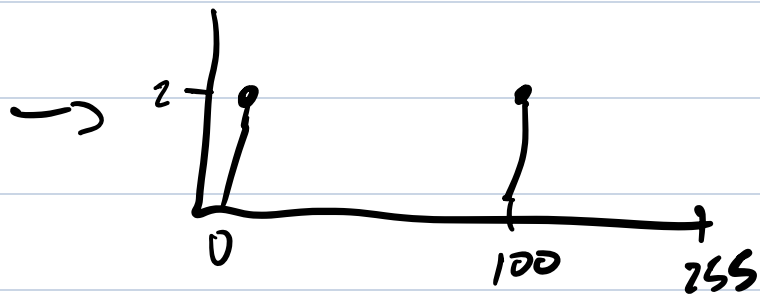
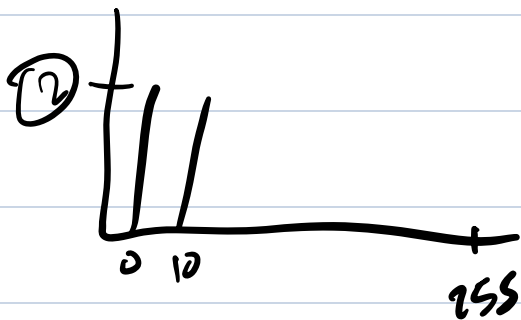
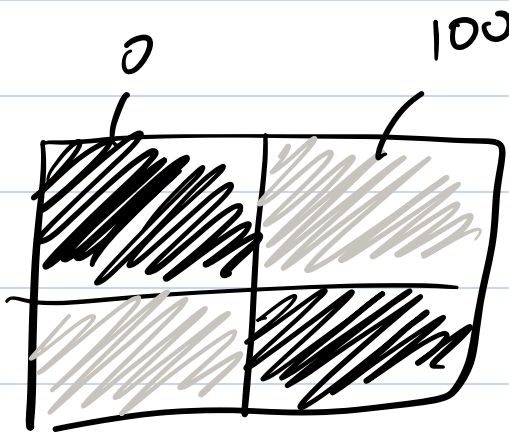
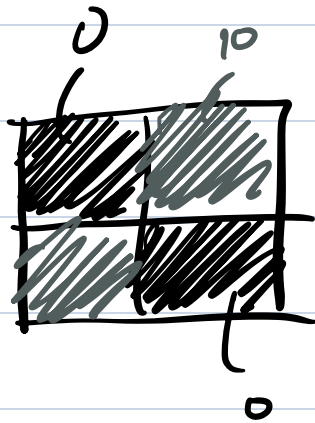
old Value	New Value
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50

155

100

250



histogram equalization

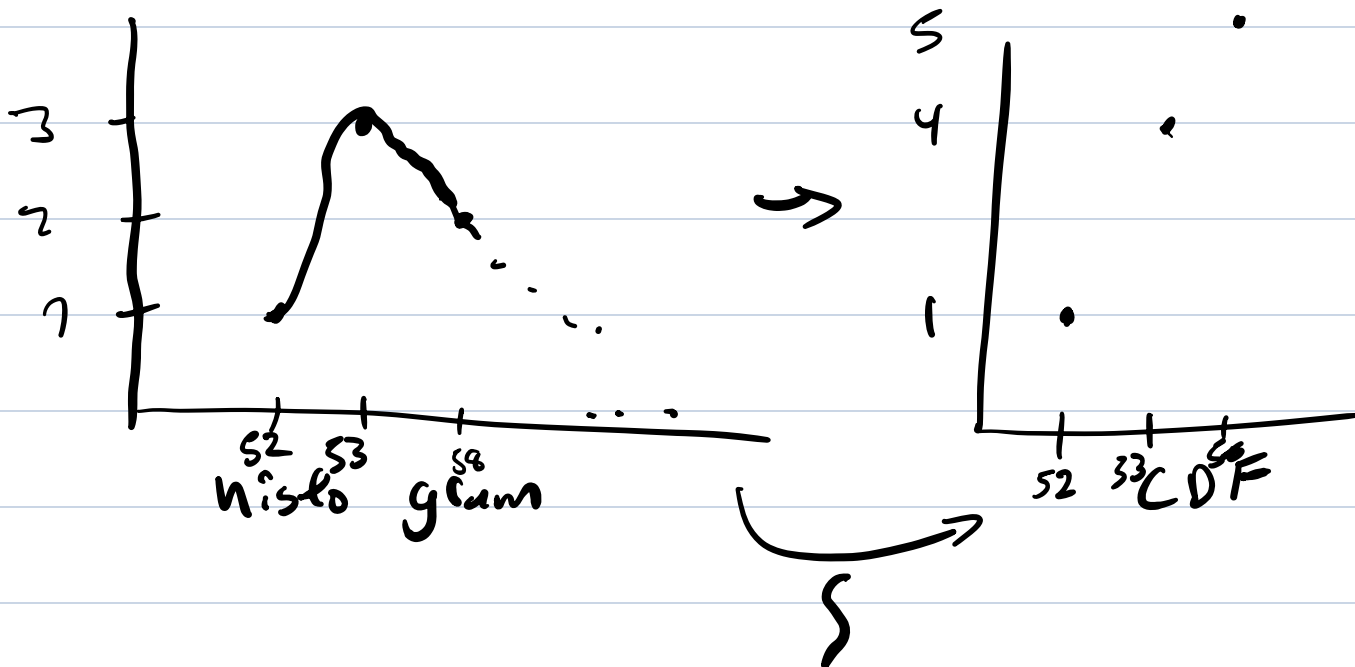
Step 1 get counts of each pixel

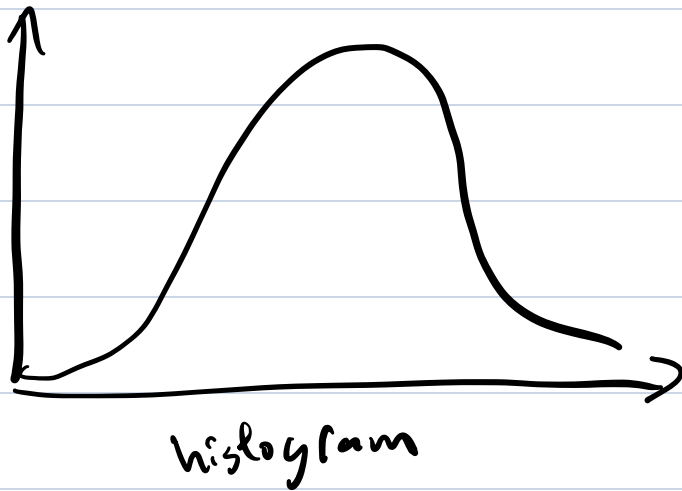
(histogram)

	Pixel Value	Count	WF	new Value
min	52	1	1	0
	53	3	4	
	58	2	6	
	⋮		⋮	
	144	1	63	
max	154	1	64	255

total number of pixels in an image

Step 2 calculate the cumulative distribution function (cdf)





Step 3 Calculate the mapping

old
value

$$\text{map}(v) = \frac{\text{cdf}(v) - \text{cdf}_{\min}}{M \times N - \text{cdf}_{\min}} \times 255$$

cdf max

Size of the
image

min

Smallest non-zero
value

$$\text{map}(s_2) = \frac{\text{cdf}(s_2) - \text{cdf}(s_2)}{64 - \text{cdf}(s_2)} \times 255$$

$$\Rightarrow \frac{1 - 1}{64 - 1} \times 255 = \frac{0}{63} \times 255 = 0$$

= 0

$$\text{map}(53) = \frac{4 - 1}{64 - 1} \times 255$$

$$\Rightarrow \frac{3}{63} \times 255 = 12.14 \sim \boxed{12}$$

$$\text{map}(154) = \frac{64 - 1}{64 - 1} \times 255 = 1 \times 255 = \boxed{255}$$