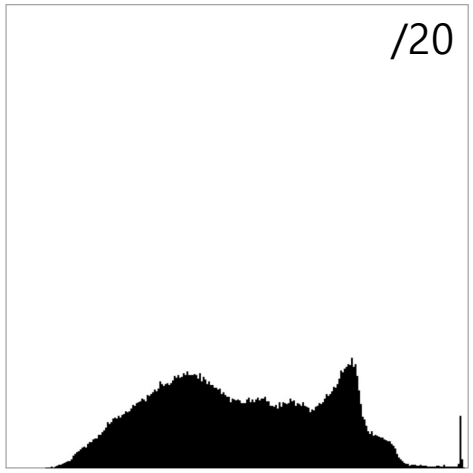
Histogram Equalization

이진영

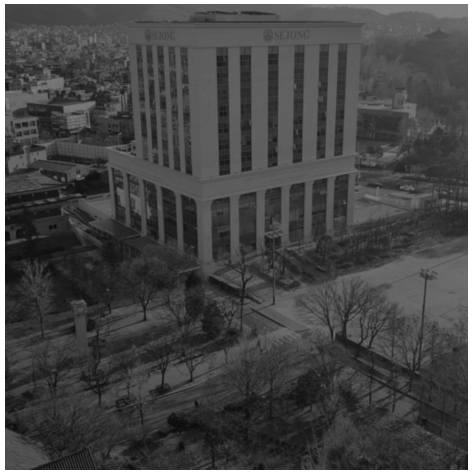
Contrast

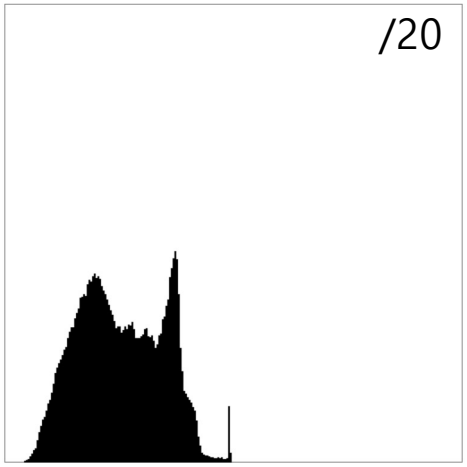
- Difference in brightness between lighter and darker areas of an image
- Difference in color or luminance that makes objects distinguishable
- Contrast > Absolute luminance in human visual system

Low Contrast



AICenterY.bmp

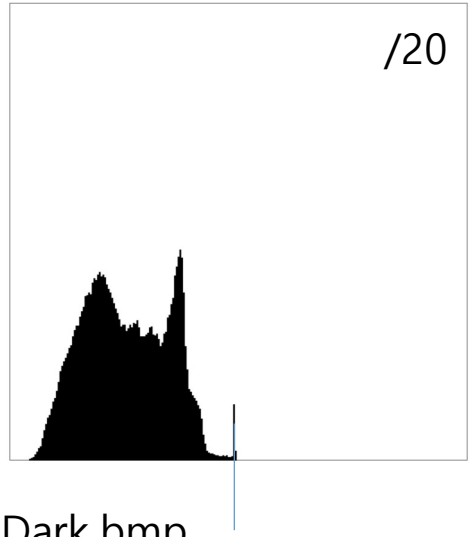




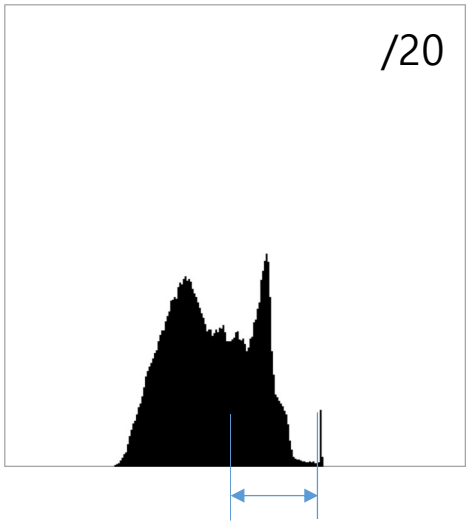
AICenterY_Dark.bmp

Histogram Sliding

- Histogram shifting for brightness



AICenterY_Dark.bmp



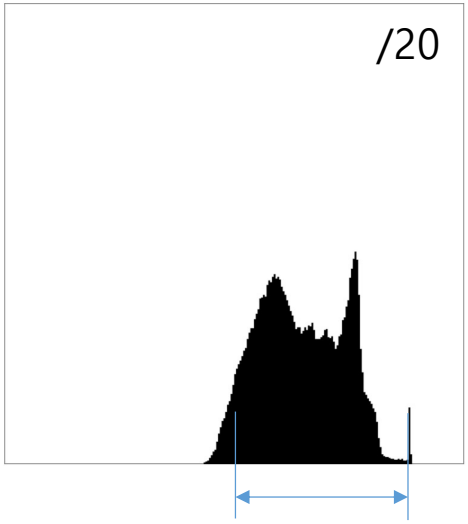
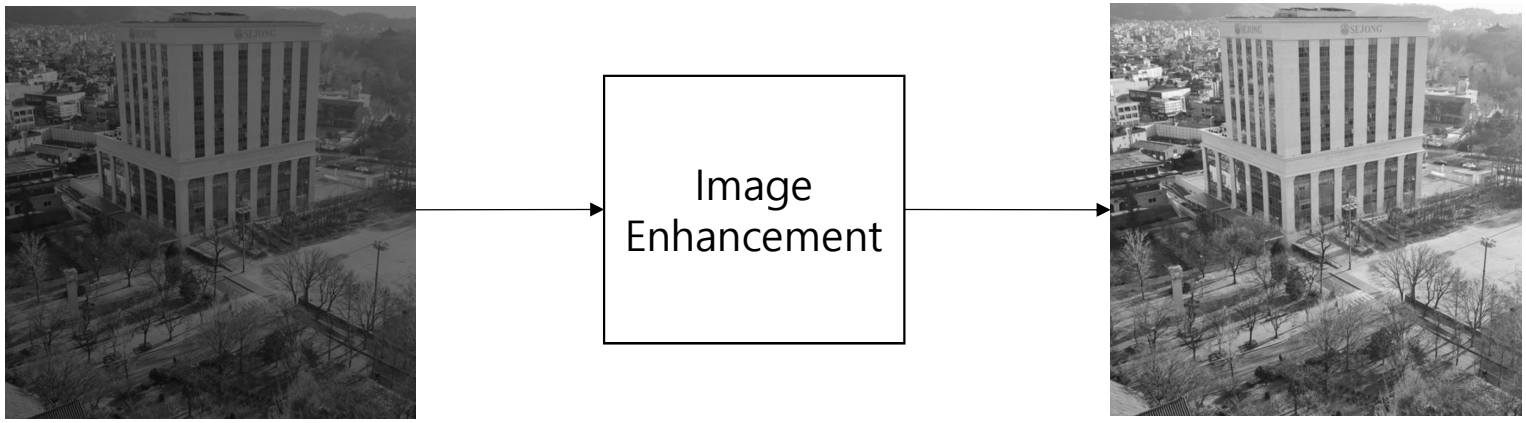


Image Enhancement

- Image processing that emphasizes certain information of an image
- Operation that improves a (subjective) quality of images, such as histogram equalization, gamma correction, image sharpening…

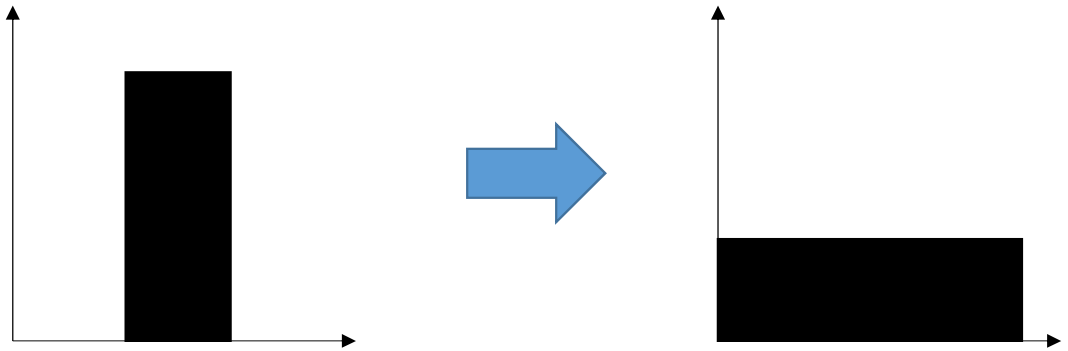


Low Quality
(Low Contrast)

High Quality

Histogram Equalization

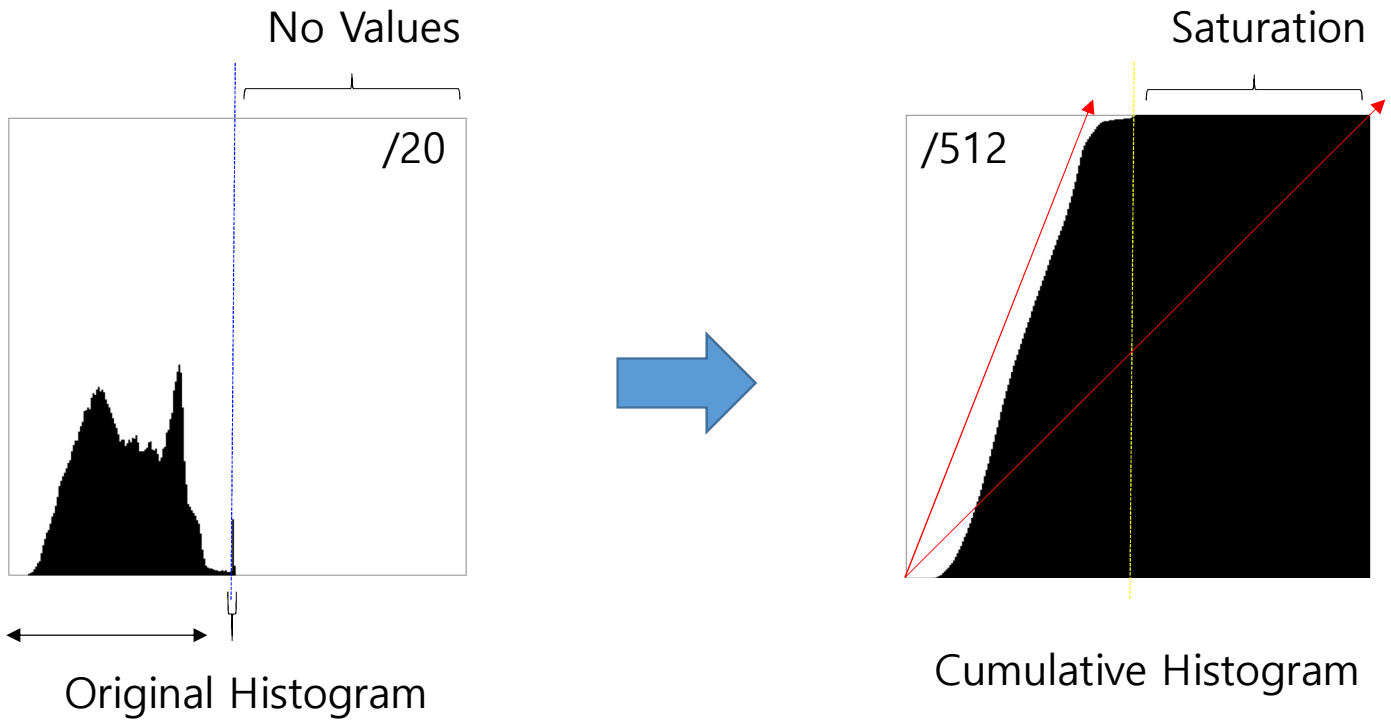
- Image processing of contrast adjustment, based on the histogram
- Modification of intensity distribution on the histogram
- Mainly for contrast enhancement



Before (Ideally) After

Cumulative Histogram

- The cumulative number of pixel values in all bins up to the current bin

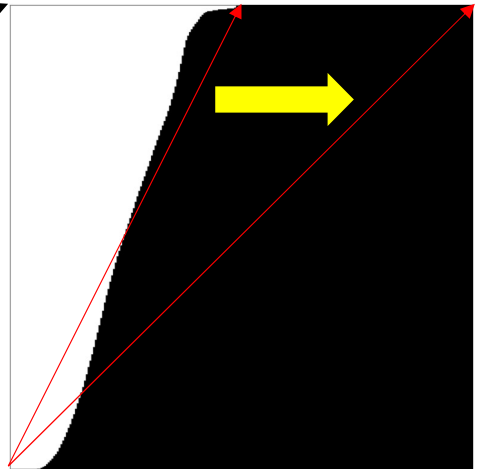


Implementation

$$k_{j,i} = MAX \times \frac{\sum_0^{n_{j,i}} H(n_{j,i})}{N}$$

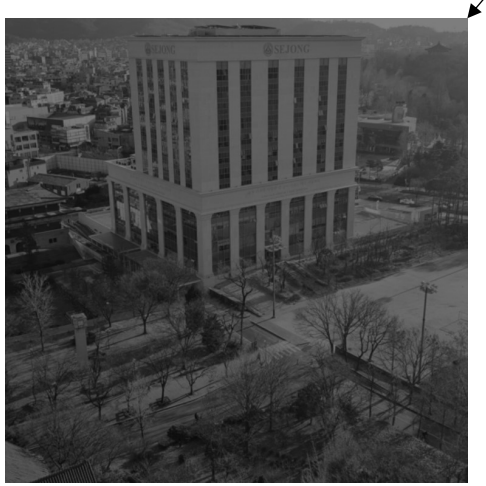
```
Y3[j * width + i] = 255 * sumHist[Y1[j * width + i]] / (width * height);
```

$$sumHist[255] = w \times h$$

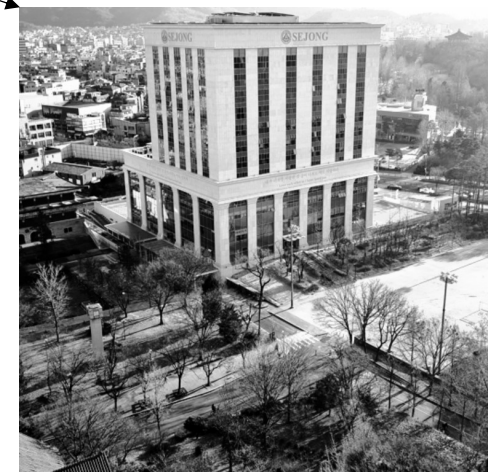


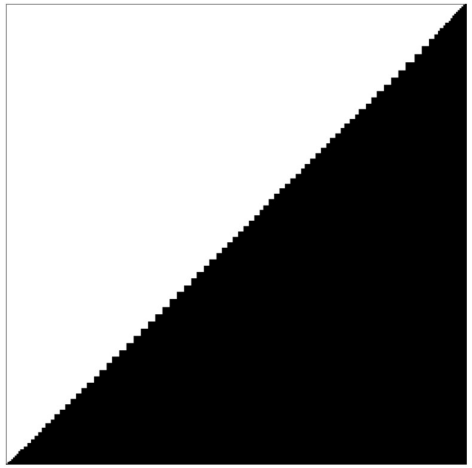
Cumulative Histogram

AICenterY_Dark.bmp

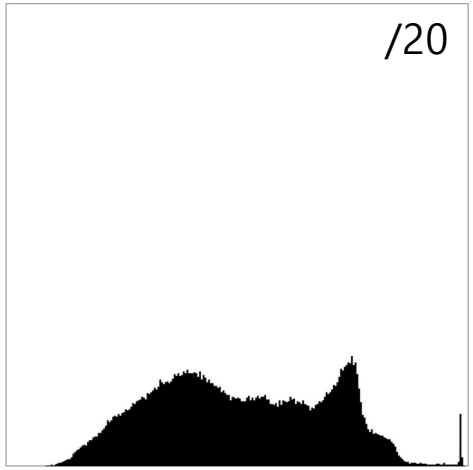


Output

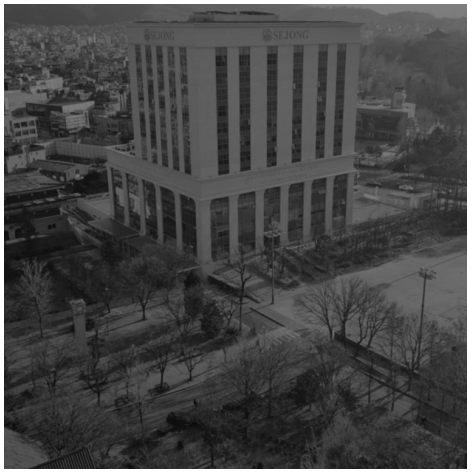


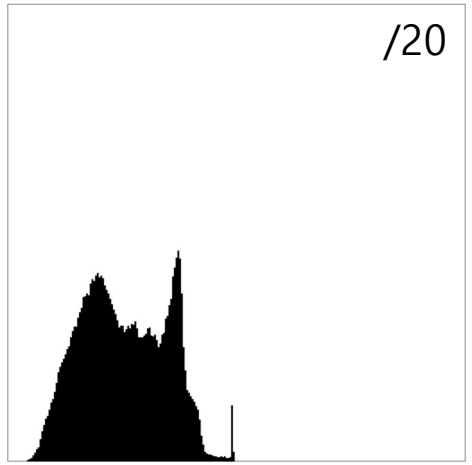


Comparison

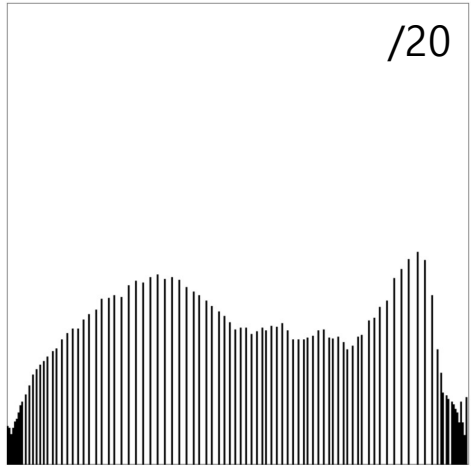


AICenterY.bmp





AICenterY_Dark.bmp



HE from AICenterY_Dark.bmp