

Spatial Domain Filtering

$$g(x,y) = T[f(x,y)] \rightarrow s = T(r)$$

↓ ↓
image function → image → pixel
filtered in intensity

→ Single Pixel Operations → Negative Image
→ Contrast Stretching

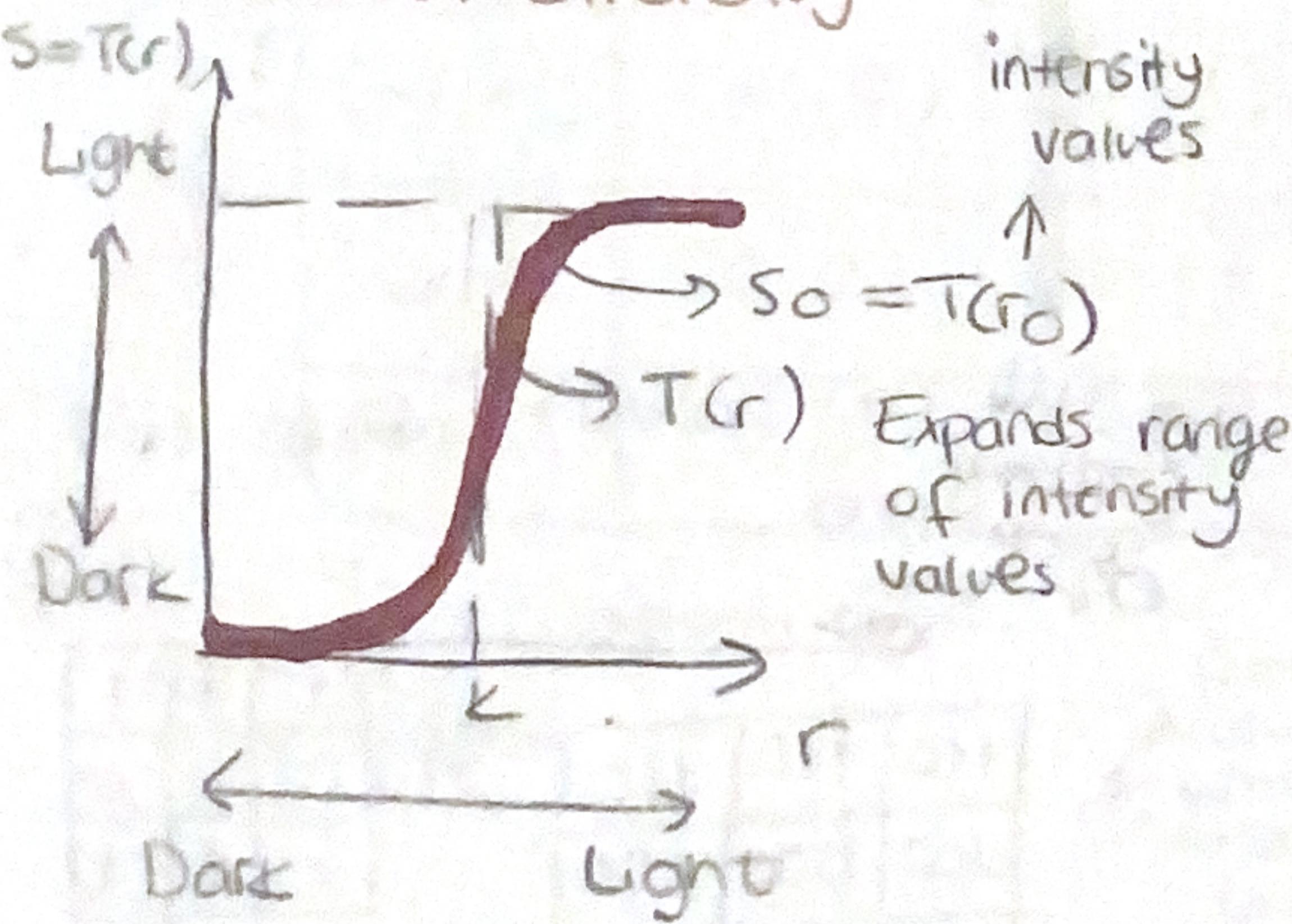
→ Neighborhood Operations → Averaging Filter
→ Median Filtering

→ Geometric Spatial Functions → Scaling → $\begin{bmatrix} cx & 0 & 0 \\ 0 & cy & 0 \\ 0 & 0 & 1 \end{bmatrix}$

$$\begin{array}{l} \xrightarrow{\text{Rotation}} \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ tx & ty & 1 \end{bmatrix} \\ \xrightarrow{\text{Translation}} \begin{bmatrix} \cos\theta & \sin\theta & 0 \\ -\sin\theta & \cos\theta & 0 \\ 0 & 0 & 1 \end{bmatrix} \end{array}$$

Intensity Transformations

Contrast Stretching



Thresholding Function

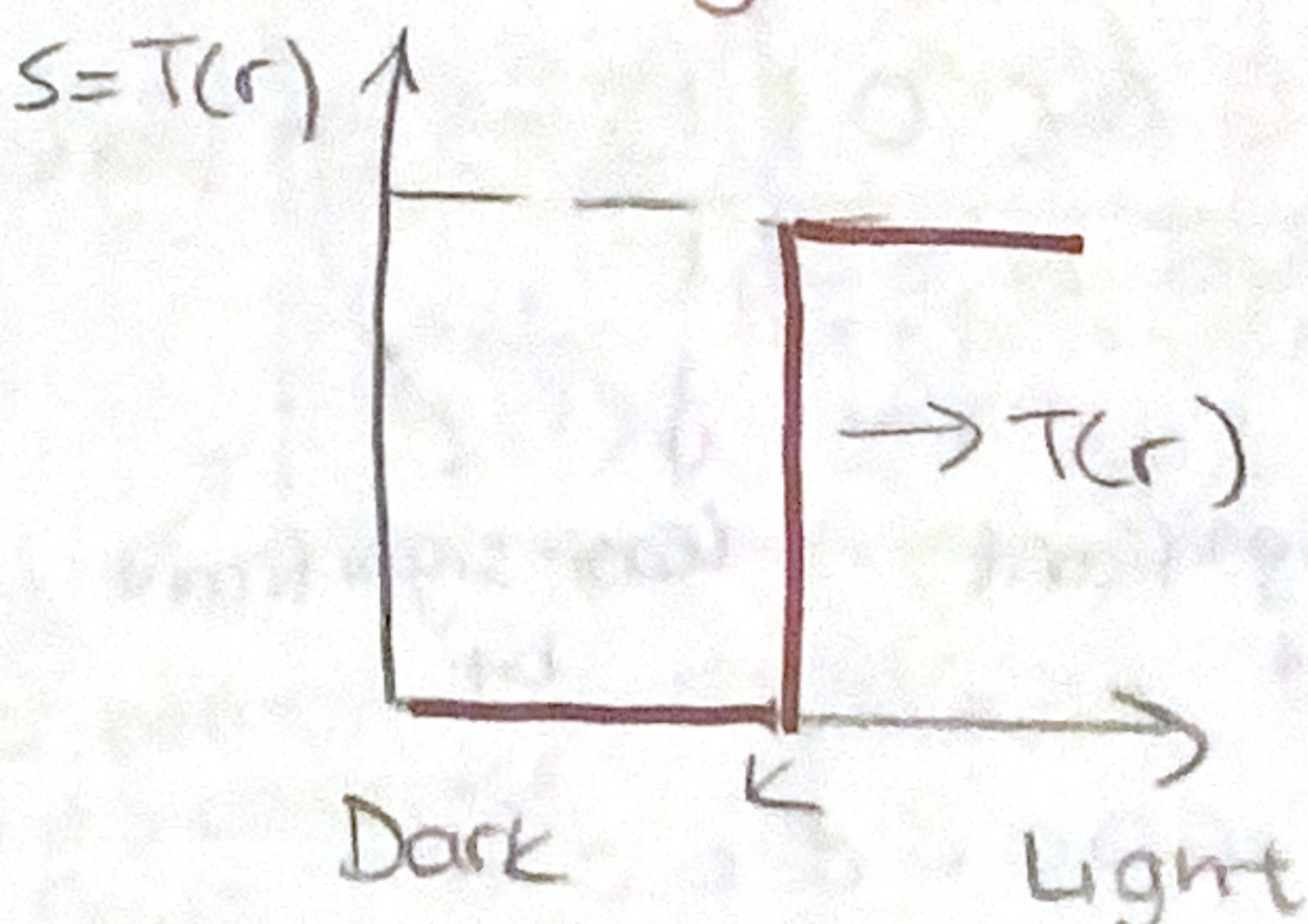
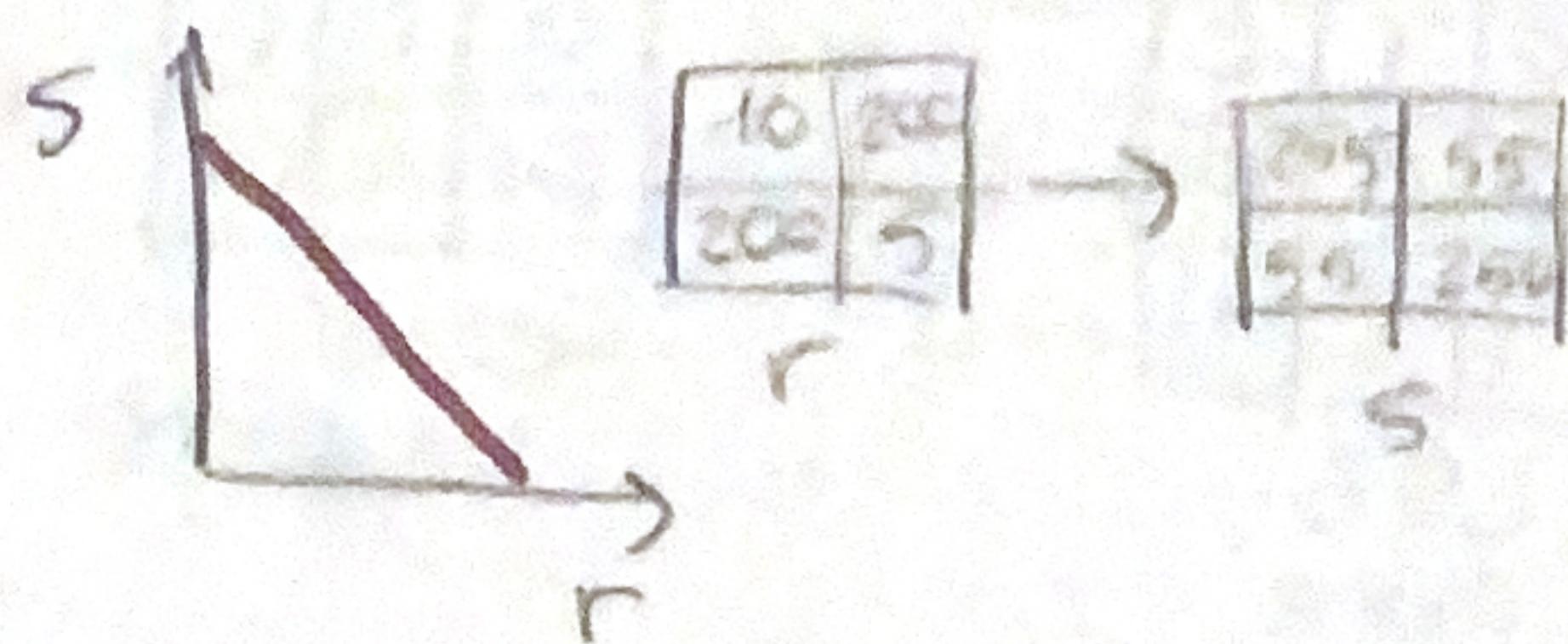


Image Negatives

- $s = L - 1 - r$



Log Transformation

- Increases the brightness
- $s = c \log(1+r)$
- Expand the values of dark pixels & compress bright pixels.

