Digital Image Processing

Image Enhancement

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Distance/online Course: Session 02 Episode #2
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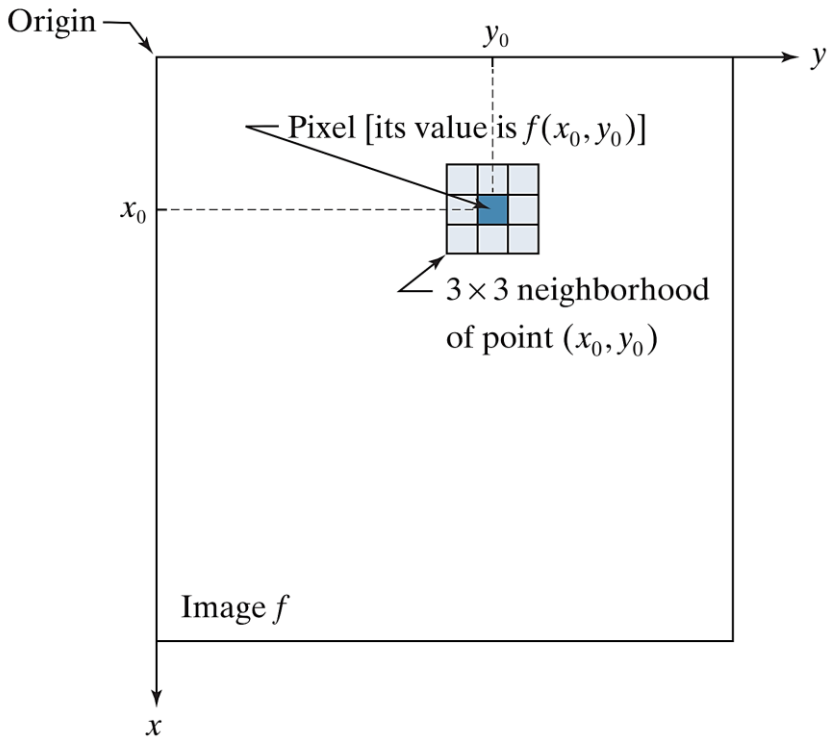
Image Enhancement

- No Explicit definition
- Methods
  - Spatial Domain:
  - Linear
- Nonlinear
- Frequency Domain:
  - Linear
  - Nonlinear

Spatial Domain Process

› Formulation and Illustration:

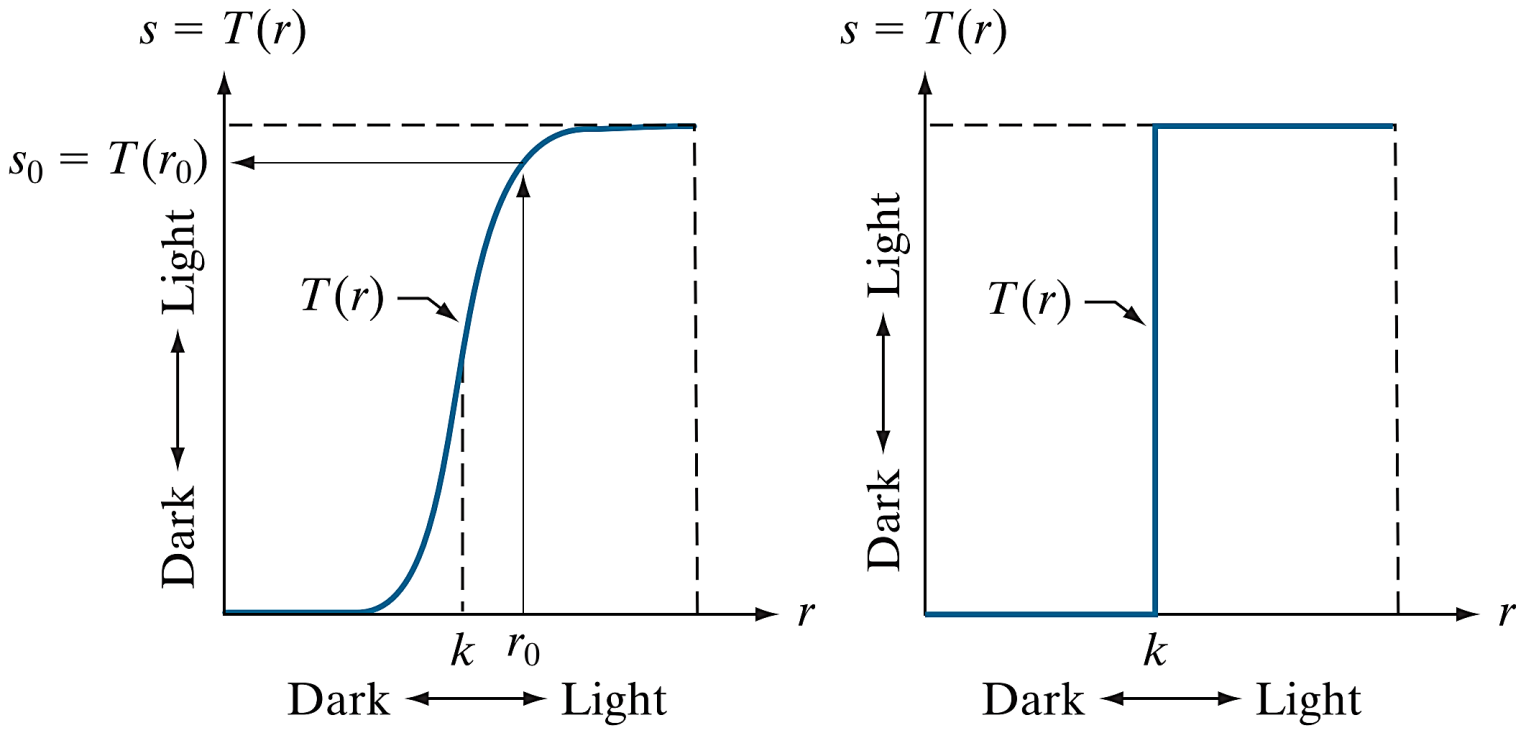
$$g(x,y) = T\{f(x,y)\}$$



Spatial Domain Process

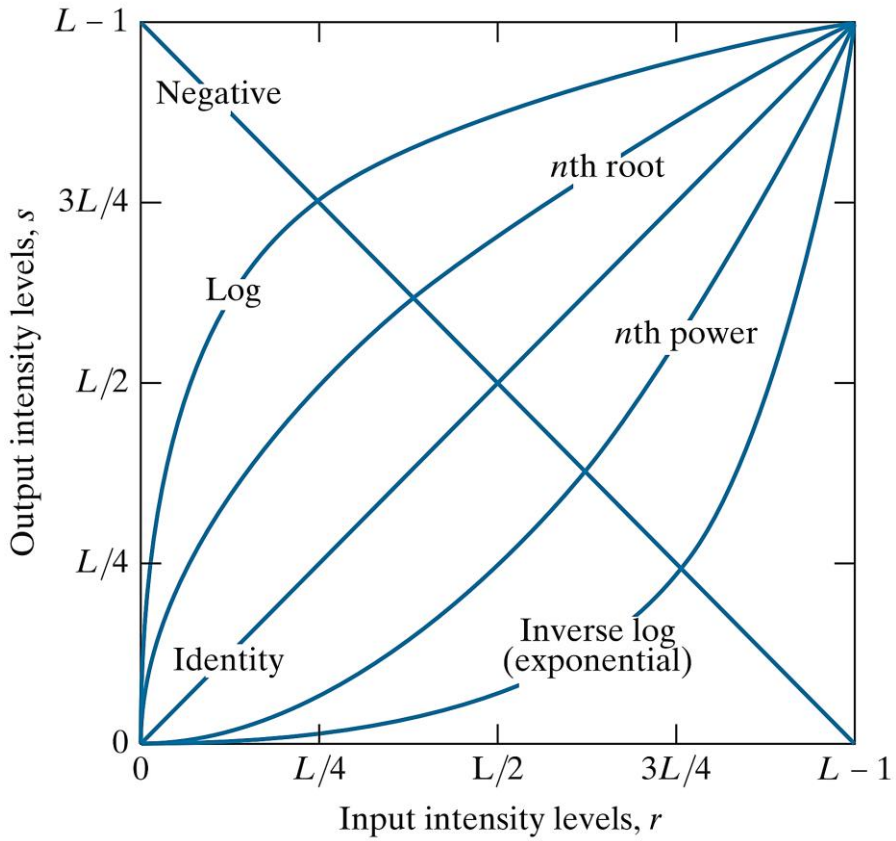
› For 1×1 window, $s = T(r)$

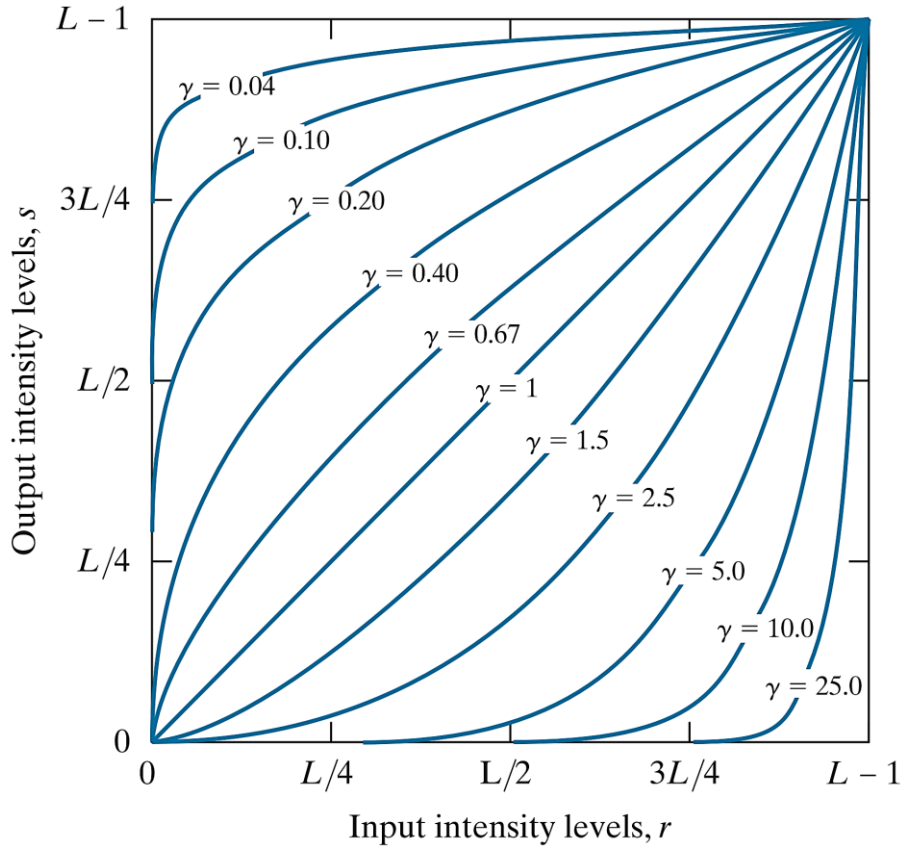
– Contrast Enhancement/Stretching/Point process



Spatial Domain Process

› Gray Level Transformation, $s = T(r)$

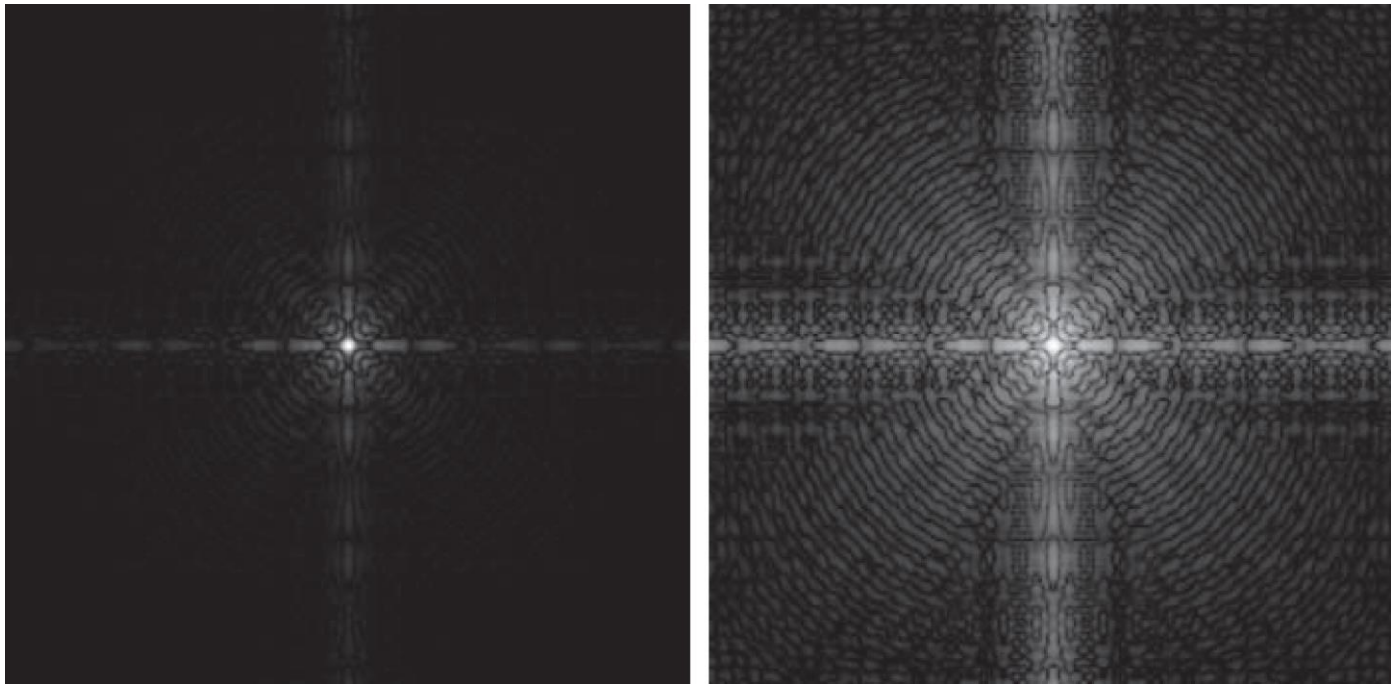




Spatial Domain Process

› Logarithmic Transformation:

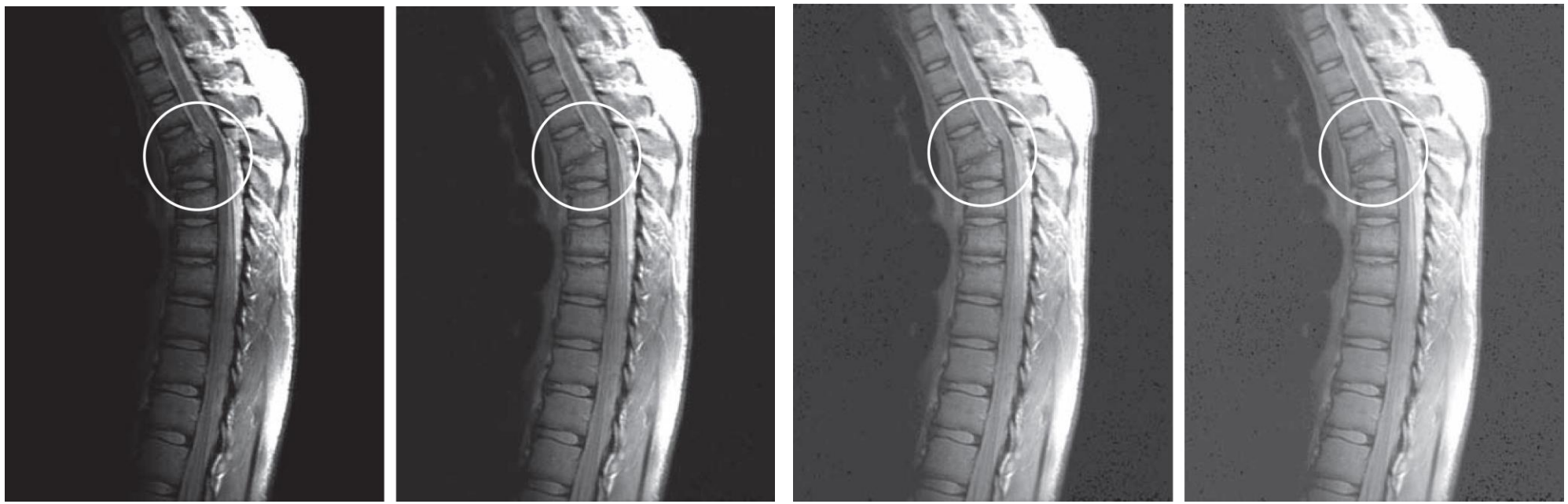
$$s = (L-1)\frac{log(r+1)}{log(L)}$$



Spatial Domain Process

› Power-Law Transformation:

$$s = (L-1)\left(\frac{r}{L-1}\right)^{\gamma}$$



$\gamma = 1.0$ $\gamma = 0.6$ $\gamma = 0.4$ $\gamma = 0.3$

Spatial Domain Process

› Power-Law Transformation:

$$s = (L-1)\left(\frac{r}{L-1}\right)^{\gamma}$$

$\gamma = 1.0$ $\gamma = 3.0$ $\gamma = 4.0$ $\gamma = 5.0$

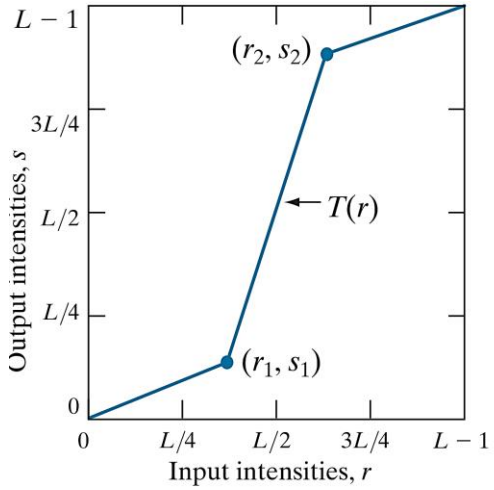
Spatial Domain Process

› Power-Law Transformation:

$$s = (L-1)\left(\frac{r}{L-1}\right)^{\gamma}$$

Spatial Domain Process

› Hand Design Transform



The End

› Incomplete! (Connection Problem)