EIE4512 - Digital Image Processing

Totorial-Matlab

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Agenda

Thresholding

Transforms

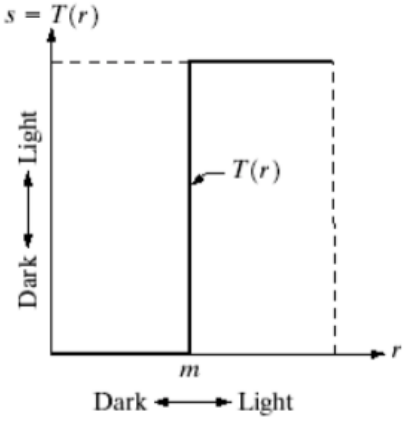
Intensity Windowing

Computing Histograms

Binned Histogram

Thresholding

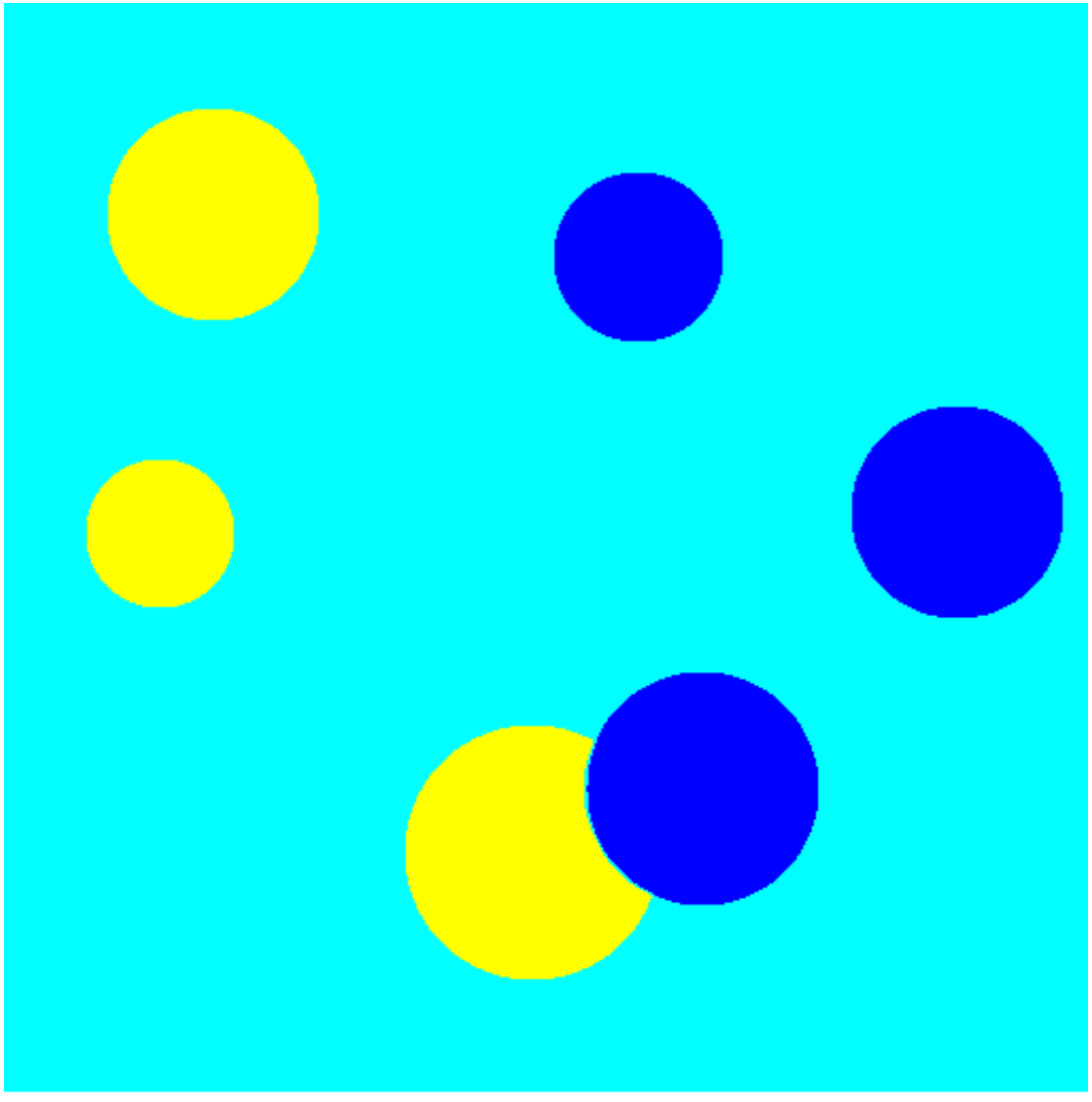
- Input values below threshold a_{th} set to a_0
- Input values above threshold a_{th} set to a_1



Thresholding

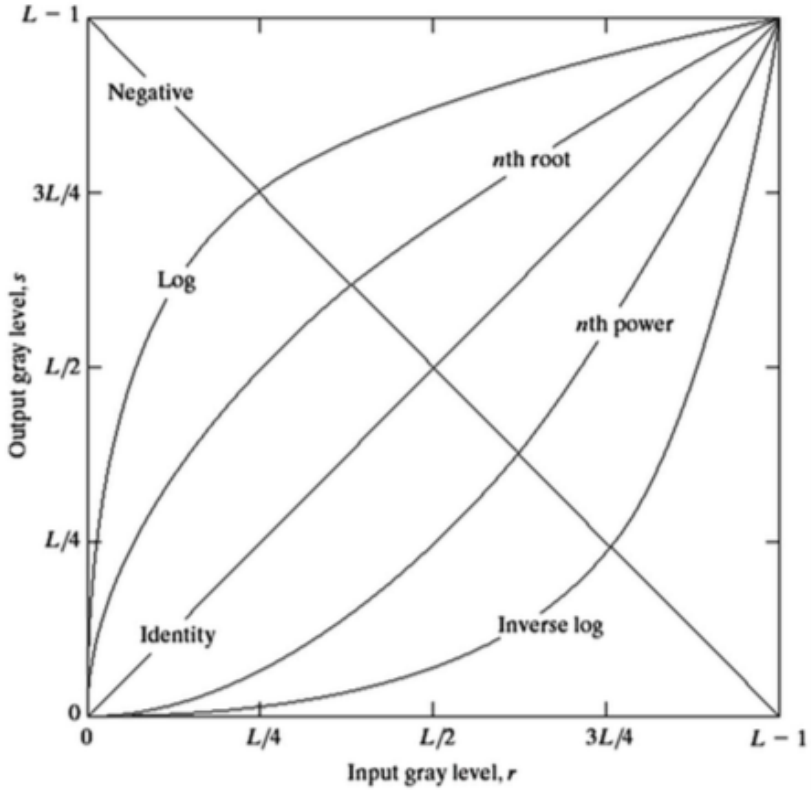
Thresholding

- Multilevel image thresholds



Transforms

- Linear
  - Negative/Identity
- Logarithmic
  - Log/Inverse log
- Power Law
  - n^{th} *power* / n^{th} *root*



Intensity Windowing

- To window an image in $[a, b]$ with max intensity M

$$f(p) = \begin{cases} 0 & \text{if } p < a \\ M \times \frac{p-a}{b-a} & \text{if } a \leq p \leq b \\ M & \text{if } p > b \end{cases}$$

Computing Histograms

- Two for loops method
- One loop, parallel method

Binned Histogram

- To create 256 bins from 14bit image

$$
\begin{array}{lcrcl}
\mathsf{h}(0) & \leftarrow & 0 & \leq I(u,v) < & 64 \\
\mathsf{h}(1) & \leftarrow & 64 & \leq I(u,v) < & 128 \\
\mathsf{h}(2) & \leftarrow & 128 & \leq I(u,v) < & 192 \\
\vdots & & \vdots & \vdots & \vdots \\
\mathsf{h}(j) & \leftarrow & a_j & \leq I(u,v) < & a_{j+1} \\
\vdots & & \vdots & \vdots & \vdots \\
\mathsf{h}(255) & \leftarrow & 16320 & \leq I(u,v) < & 16384
\end{array}
$$

Histogram Equalization

- $histeq(I, n)$