

## GRAYSCALE TRANSFORMATION

$$g[m,n] = t[f[m,n]]$$

$t[b]$  - mapping from integers  $0, \dots, 255$  to integers  $0, \dots, 255$

described by a lookup table

## Example

$$M = N = 4$$

3 bits/pixel  $b = 0, 1, \dots, 7$

Image

$f[m,n]$

2	2	3	3
2	3	3	4
3	3	4	4
3	4	4	5

Histogram

$b$	$h_f[b]$
0	0
1	0
2	$3/16$
3	$7/16$
4	$5/16$
5	$1/16$
6	0
7	0

Input Image

$f[m,n]$

2	2	3	3
2	3	3	4
3	3	4	4
3	4	4	5

Transformation

$b$	$t[b]$
0	0
1	0
2	0
3	2
4	6
5	7
6	7
7	7

Output Image

$g[m,n]=t[f[m,n]]$

0	0	2	2
0	2	2	6
2	2	6	6
2	6	6	7

Image

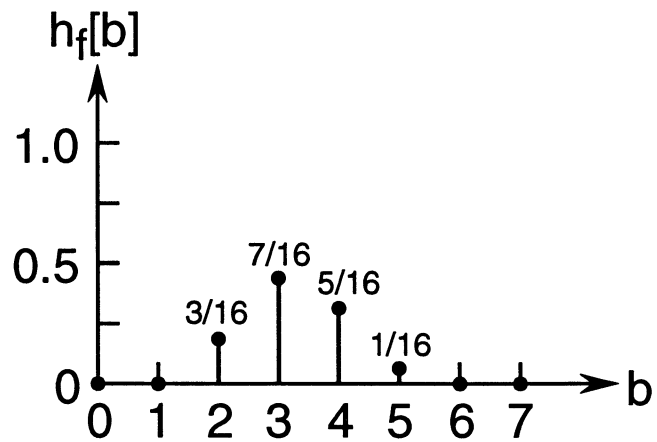
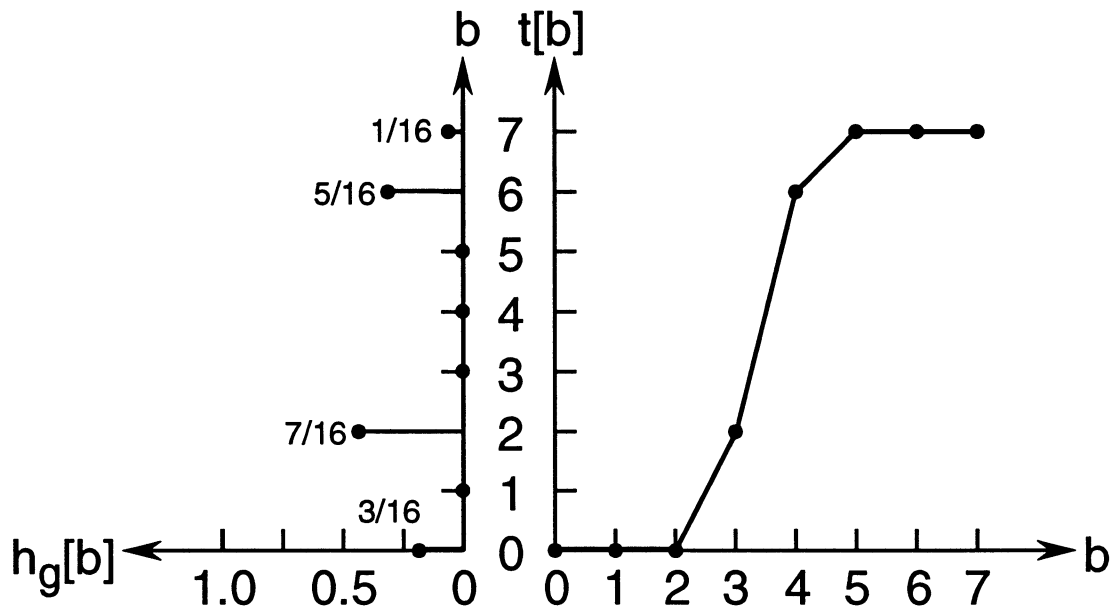
$g[m,n]$

0	0	2	2
0	2	2	6
2	2	6	6
2	6	6	7

Histogram

$b$	$h_g[b]$
0	3/16
1	0
2	7/16
3	0
4	0
5	0
6	5/16
7	1/16

# Summary Representation



## Comments

- Relation between input and output histograms

$$h_g[b] = \sum_{b' : b = t[b']} h_f[b']$$

- Operation is point-to-point

## **Applications of Grayscale Transformations**

1. Quantization
2. Calibration
3. Contrast modification
4. Gamut mapping
5. Feature selection
6. Contour Generation
7. Pseudocolor
8. Classification