Histogram processing

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First read lecture notes. We will build histogram for following image.

A 3-bit 4x4 image

$$\begin{bmatrix} 2 & 4 & 7 & 7 \\ 4 & 7 & 7 & 5 \\ 5 & 7 & 7 & 4 \\ 7 & 7 & 5 & 2 \end{bmatrix}$$

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Let's count every value and fill the following table

Value	Counts
0	
1	
2	
3	
4	
5	
6	
7	

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Let's count every value and fill the following table

Value	Counts
0	0
1	0
2	2
3	0
4	2
5	3
6	0
7	8
	16

max value for 3 bit image $2^3 - 1$

should be # of pixels

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0	0
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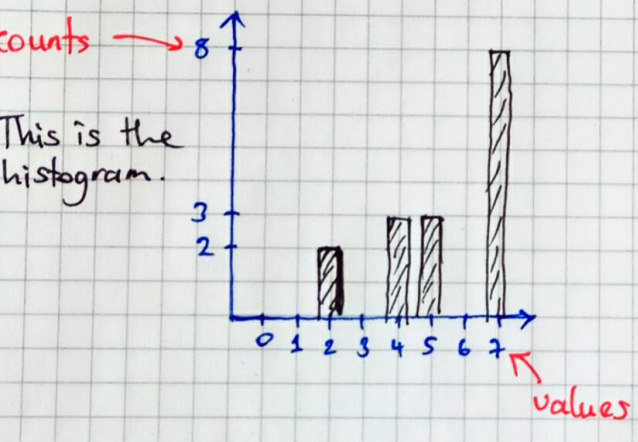
7	8
±	16

max value for 3bit image $2^3 - 1$

should be # of pixels



This is the histogram.

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0	0
1	0
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7	8
±	16

max value for 3 bit image $2^3 - 1$

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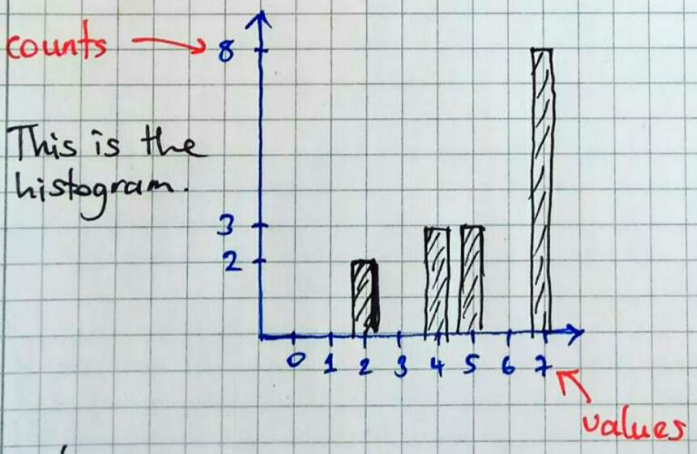

This is the histogram.

Darker colors ← → lighter colors

This is a very lightly colored image.

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$$\begin{bmatrix} 2 & 4 & 7 & 7 \\ 4 & 7 & 7 & 5 \\ 5 & 7 & 7 & 4 \\ 7 & 7 & 5 & 2 \end{bmatrix}$$

Let's count every value and fill the following table

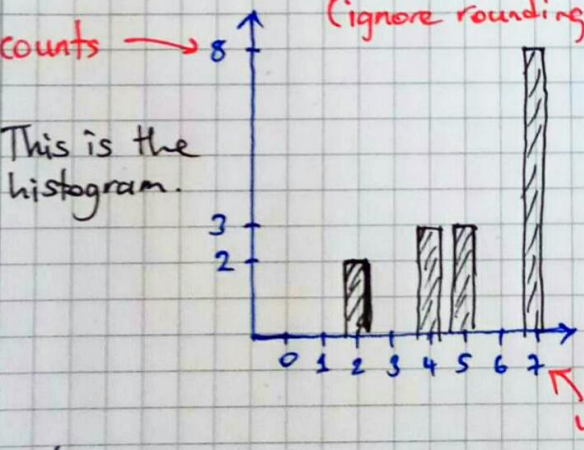
→ Probability distribution function ($\frac{\text{count}}{\text{pixels}}$)

Value	Counts	PDF
0	0	0
1	0	0
2	2	0.13
3	0	0
4	3	0.19
5	3	0.19
6	0	0
7	8	0.5
	16	1

max value for 3bit image $2^3 - 1$

should be # of pixels

should be 1 (ignore rounding errors)



This is the histogram.

$\frac{2}{16} = 0.13$

$\frac{3}{16} = 0.19$

$\frac{8}{16} = 0.5$

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Let's count every value and fill the following table

→ Probability distribution function ($\frac{\text{count}}{\text{pixels}}$)

Value	Counts	PDF	CDF → Cumulative (Sum upto)
0	0	0	0
1	0	0	0
2	2	0.13	0.13
3	0	0	0
4	3	0.19	0.31 (0.13+0.19) * 0.31 due to rounding!
5	3	0.19	0.5 (0.31+0.19)
6	0	0	0
7	8	0.5	1 → should be 1
	16	1	

max value for 3 bit image $2^3 - 1$

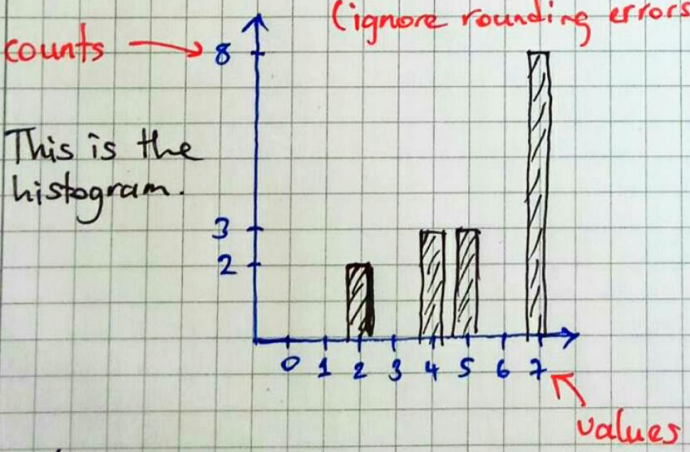
should be # of pixels

should be 1 (ignore rounding errors)

$\frac{2}{16} = 0.13$

$\frac{3}{16} = 0.19$

$\frac{8}{16} = 0.5$



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