

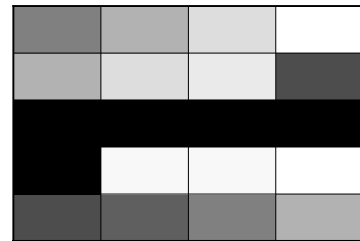
Digital Image

a digital image is a rectilinear array of samples of a continuous image

digital image example

.38	.22	.1	.009
.28	.17	.18	.58
.99	.99	.99	.98
.97	.07	.07	.009
.5	.48	.38	.21

digital image example



is it digital?



fidelity

- space discretization
- color quantization

space discretization



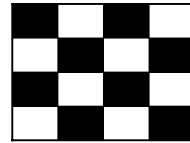
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nyquist criteria

sample at more than twice the highest frequency to avoid aliasing



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aliasing in images

_____ "jaggies"

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fidelity

- space discretization
- color quantization

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color quantization

- number of channels
- bits per channel

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channels



1 channel



3 channel

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color models

- RGB: red, green, blue
- HSV: hue, saturation, value

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bits per channel



1 bit per channel



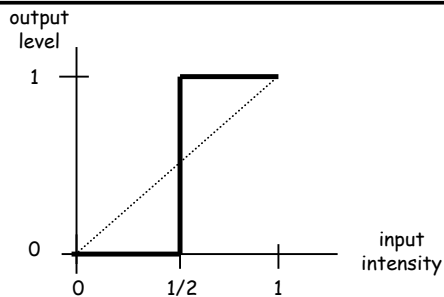
8 bits per channel

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uniform quantization: 2 level

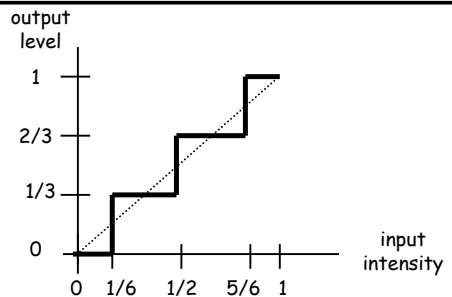


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uniform quantization: 4 level



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uniform quantization: n level

- output levels:

$$L_i^n = i/(n-1), i = 0, \dots, n-1$$

- thresholds:

$$T_i^n = (L_{i-1}^n + L_i^n)/2 = (2i-1)/2(n-1), i = 1, \dots, n-1$$

- quantization function:

$$Q_n: [0,1] \rightarrow \{0, 1/(n-1), 2/(n-1), \dots, 1\}$$

$$Q_n(v) = \lfloor v(n-1) + 0.5 \rfloor / (n-1)$$

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digital image processing

- avoid/correct errors
- restore
- enhance
- analyze
- create

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