Fundamentals of Digital Images

* Digital Acquisition Model
  + Functions
    - Illumination Function
      * Represented by i(x,y)
      * Continuous
    - Reflection Contribution Function
      * Represented by r(x,y)
    - F(x,y) = i(x,y) \* r(x,y)
* Digitization of a Continuous Signal (2 stages)
  + Quantization
    - Transformation to discrete using approximation
    - Fq is a staircase function
    - Min and max create a range of L levels.
      * L = 2^b
      * Fq is made up of q1…qL
    - Center point is given to all values within range. See Deskoy’s notes for a sketch.
  + Coding
    - Produces an output of stream of bits
      * q1 – ’00…0’
      * q2 – ’00…1’
      * qL – ’11…1’

Assignment as part of the first homework set:

* (Build a quantizer) Reduce the representation of the image lenna.jpg from 8 bits per pixel to 4 bits per pixel using the following substitution table:

|  |  |
| --- | --- |
| F | G |
| 0-15 | 7 |
| 16-31 | 23 |
| 32-47 | 39 |
| … | … |
| 240…255 | 247 |

* Apply imshow to display image g
* Compute the average error between f and g.
  + MSE = sigma[(f-g)^2]/size