Homework 6

Sunday, May 5, 2024 11:47 AM

1. When applying a standard linear filter, the normalization factor is a function of the number of pixels in the filter and is trivial to compute. In a bilateral filter, a new normalization factor must be computed per pixel and tracked in a sum. After computing the contribution of each pixel in the kernel, we normalize the value using the running sum.

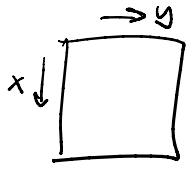
2. If most of the values cluster into two small ranges with low or high luminance, the resulting image will appear as black + white. Generally a linear mapping to $[0,1]$ will not be perceptually sensitive as human eyes are better at distinguishing small changes at low luminance versus at high luminance.

3. A pixel is a discretization of the continuous signal of light that impinges on the camera sensor. The amount of space represented by a pixel depends on the distance from the light source to the camera.

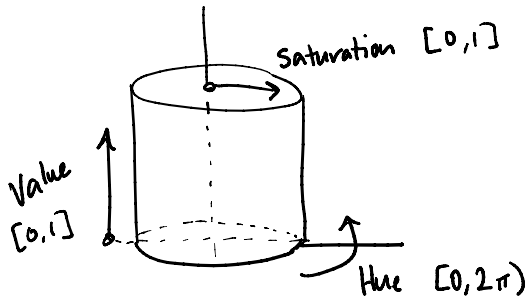
4. $$H_a = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}$$ shift all values down 1 row

$$H_b = \frac{1}{12}\begin{bmatrix} 1 & 2 & 1 \\ 1 & 2 & 1 \\ 1 & 2 & 1 \end{bmatrix}$$ detect vertical edges + smooth slightly

$$H_c = \begin{bmatrix} -1 & -1 & -1 \\ 0 & 0 & 0 \\ 1 & 1 & 1 \end{bmatrix}$$ detect horizontal edges – like taking $\frac{d}{dx}$



5. cylindrical coordinate system for color



(per Wikipedia)