Image Acquisition & Representation

Computer Vision Detection:

- Detection - “Are there x”
- Verification - “Is that y”
- Identification - “Is that a picture of x”
- Organisation
- Scene and context categorization
- 3D layout, depth ordering

Computer Vision Challenges:

- Orientation
- Illumination
- Occlusion
- Scale
- Deformation
- Background clutter
- Object intra-class variation
- Local ambiguity
- The world behind the image

Modelling a spatial brightness pulse:

$$\int_{-\infty}^{-\infty} \delta(t)dt = 1 \qquad \delta(t) = \lim_{\epsilon \to 0}[y_\epsilon(t)]$$

Sifting Property:

$$\int_{-\infty}^{\infty} f(t)\delta(t)dt = f(0) \to \int_{-\infty}^{\infty} f(t)\delta(t-\alpha)dt = f(\alpha)$$

The sifting property can be used to express a 2D image function as a linear combination of 2D Dirac pulses located at points (a,b) that cover the whole image plane.

$$\int_{-\infty}^{\infty}\int_{-\infty}^{\infty} f(a,b)\delta(a-x,b-y)dadb = f(x,y)$$

Ideally, the optical system should map point information to points. However optical systems are not ideal. Each point will have some spread which will be represented by a point spread function. An image is the sum of the PSF of all its points. The Point spread function can be modelled by the Dirac Impulse function.

Point spread function:

$$g(x, y) = f(x, y) * (h, x) \qquad h(x, y) = PSF$$

Colour Spaces:

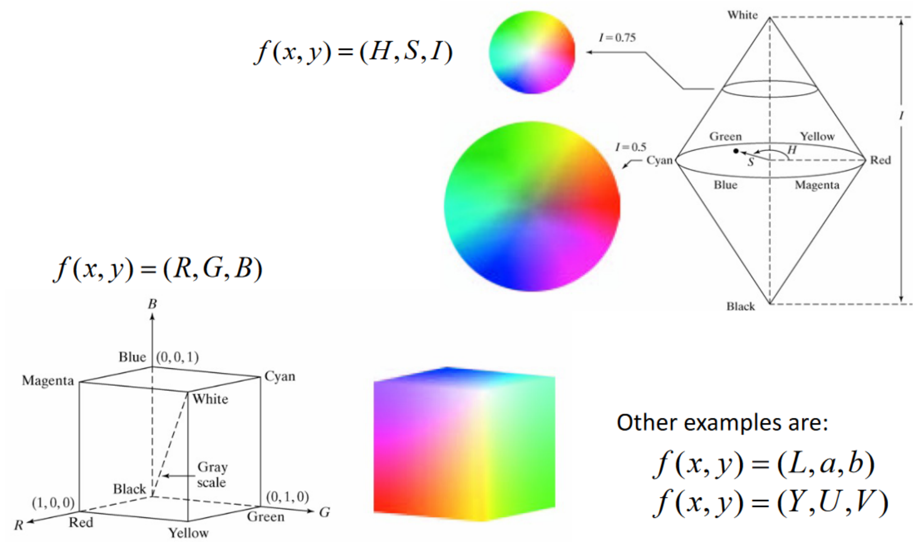

Figure 1: Untitled

The effect of spare sampling is aliasing, anti-aliasing can be achieved by removing all spatial frequencies above a critical limit. Removing sharp edges.