

Image representation

- A digital image is represented as a 2D (light) intensity function $f(x,y)$, (x,y) are spatial coordinates. $\underline{x} = \begin{bmatrix} x \\ y \end{bmatrix} = [x \ y]^T$ $I(x,y) = I(\underline{x}) = v$

- $f(x,y)$ has values proportional to the brightness at that point.

- $f(x,y)$ can represent a gray scale image -> one scalar value for each (x,y)

- $f(x,y)$ can represent a color image -> 3D vector with values for each (x,y) , $\underline{v} = \begin{bmatrix} v_{red} \\ v_{green} \\ v_{blue} \end{bmatrix}$ representing color. For example as RGB (red-green-blue)

- $f(x,y)$ can represent a hyperspectral image -> vector of size $P > 3$ for each (x,y) .

$$\underline{v} = \begin{bmatrix} v_1 \\ v_2 \end{bmatrix} \quad \text{LANDSAT} \\ \text{RGB + infrared bands}$$