2. Digital Image Fundamentals (17/01/24) Lecture-2

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Source: Digital Image Processing, 4e, Rafael C. Gonzalez, Richard E. Woods

1. Image Sensing and Acquisition

Using Sensors: Input to the sensor is light intensity and the output is voltage.





Digitizing is to sample the function in both coordinates and also in intensity.

Sampling: Digitizing the coordinate values.

Quantization: Digitizing the intensity values.



3. Representation of Digital Images

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f(x, y), containing M rows and N columns, integer values for these discrete coordinates: $x = 0, 1, 2, \dots, M-1$ and $y = 0, 1, 2, \dots, N-1$

Spatial Domain, Spatial Coordinates

$$f(x,y) = \begin{bmatrix} f(0,0) & f(0,1) & \cdots & f(0,N-1) \\ f(1,0) & f(1,1) & \cdots & f(1,N-1) \\ \vdots & \vdots & & \vdots \\ f(M-1,0) & f(M-1,1) & \cdots & f(M-1,N-1) \end{bmatrix}$$

Matrix form:

$$\mathbf{A} = \begin{bmatrix} a_{0,0} & a_{0,1} & \cdots & a_{0,N-1} \\ a_{1,0} & a_{1,1} & \cdots & a_{1,N-1} \\ \vdots & \vdots & & \vdots \\ a_{M-1,0} & a_{M-1,1} & \cdots & a_{M-1,N-1} \end{bmatrix}$$

