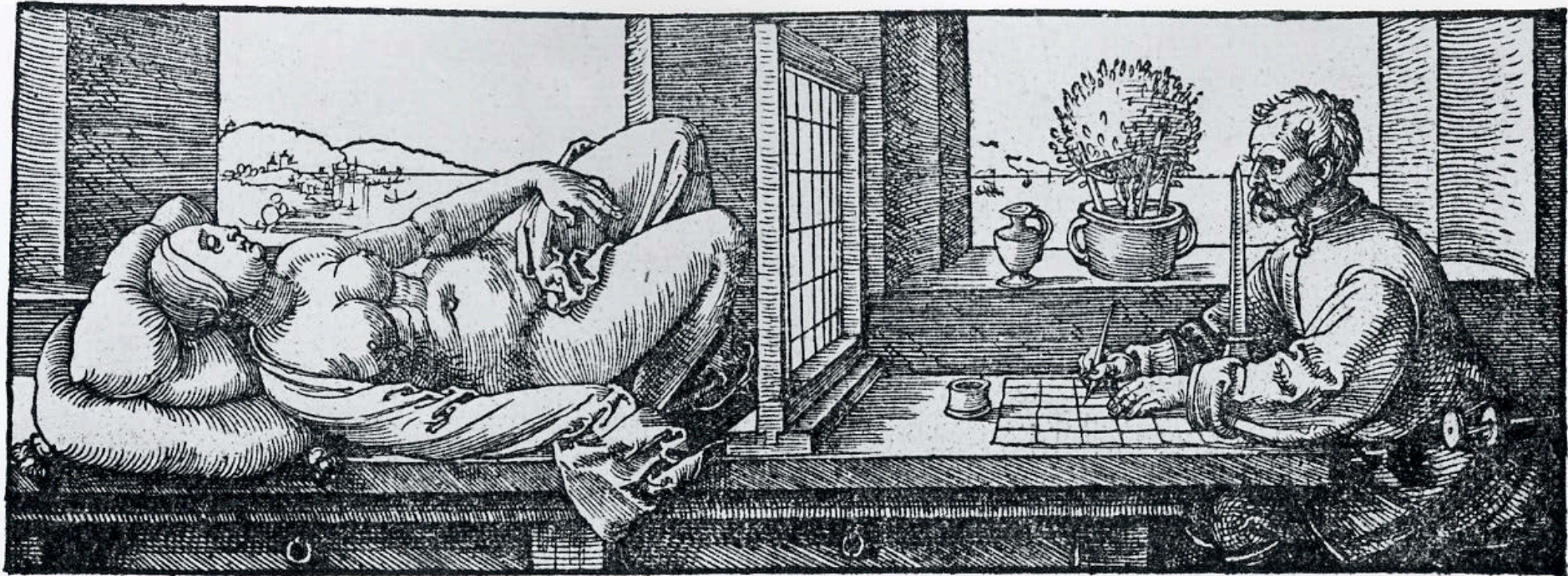


Digital Image Processing

EE368/CS232

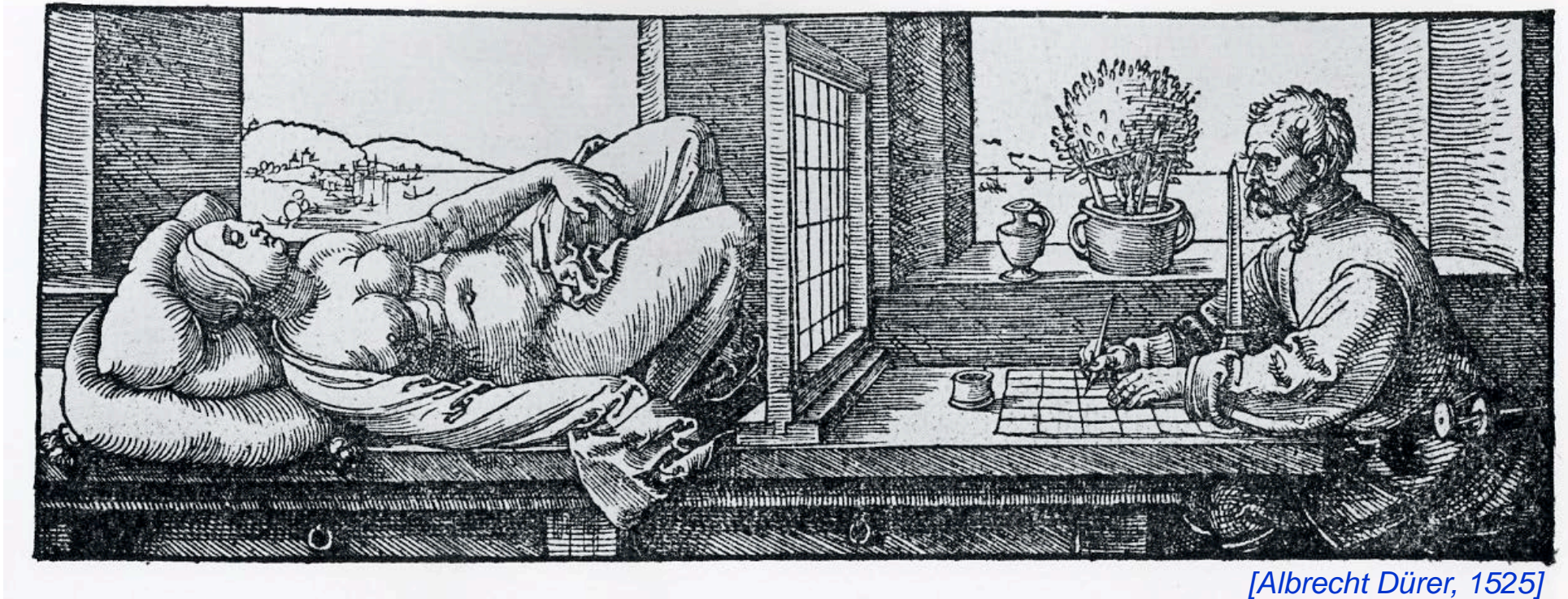
Bernd Girod
Department of Electrical Engineering
Stanford University

What is an image?



[Albrecht Dürer, 1525]

What is an image?



- **Image:** a visual representation in form of a function $f(x,y)$ where f is related to the brightness (or color) at point (x,y)
- Most images are defined over a rectangle
- Continuous in amplitude and space

Digital Images and Pixels

- **Digital image:** discrete samples $f[x,y]$ representing continuous image $f(x,y)$
- Each element of the 2-d array $f[x,y]$ is called a **pixel** or **pel** (from “picture element”)



200x200



100x100

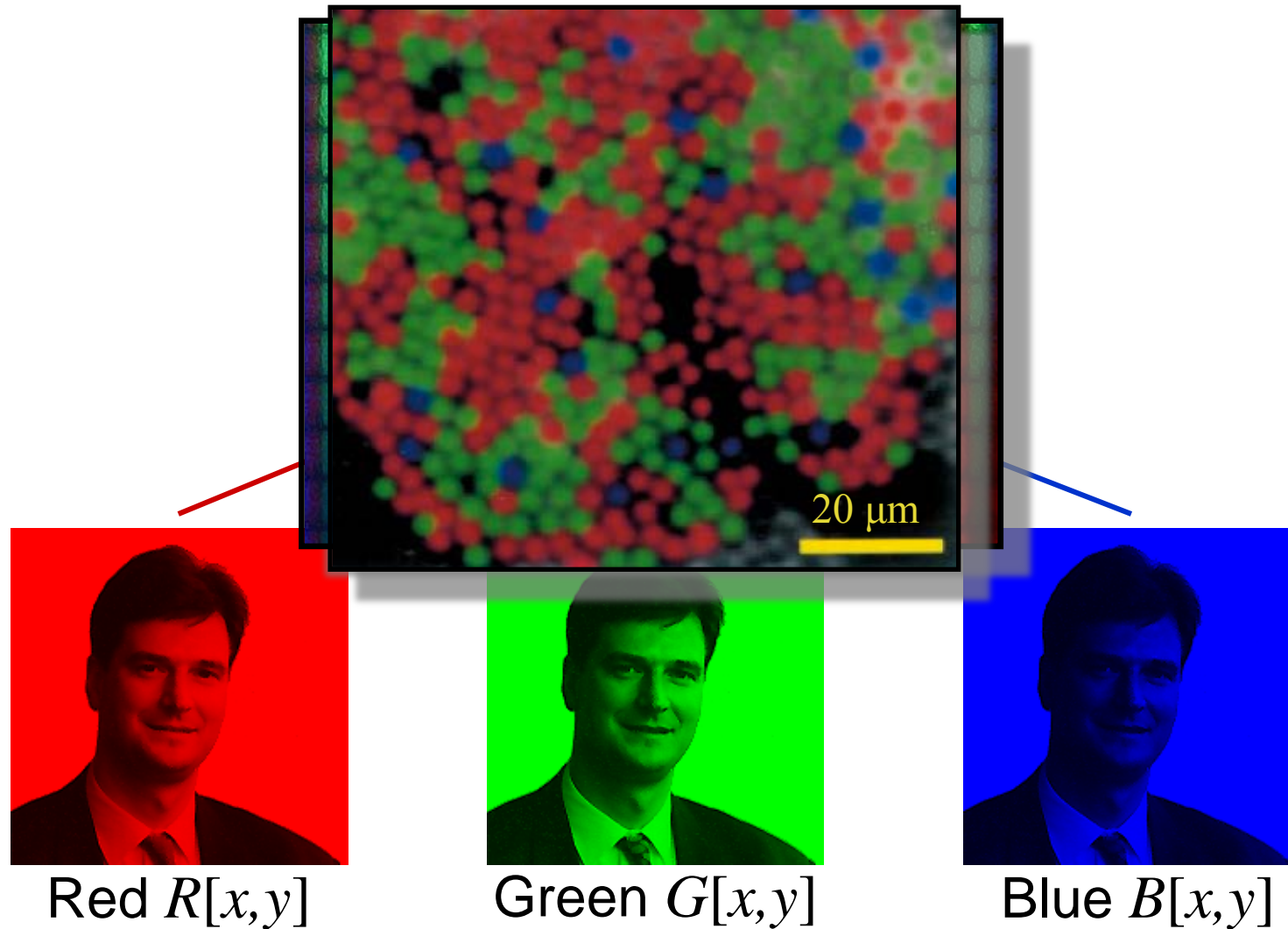


50x50



25x25

Color Components



Monochrome image



$$R[x,y] = G[x,y] = B[x,y]$$

Why do we process images?

- Acquire an image
 - Correct aperture and color balance
 - Reconstruct image from projections
- Prepare for display or printing
 - Adjust image size
 - Color mapping, gamma-correction, halftoning
- Facilitate picture storage and transmission
 - Efficiently store an image in a digital camera
 - Send an image from space
- Enhance and restore images
 - Touch up personal photos
 - Color enhancement for security screening
- Extract information from images
 - Read 2-d bar codes
 - Character recognition
- Many more ... image processing is ubiquitous

