



PENGOLAHAN CITRA DIGITAL

Aditya Wikan Mahastama
mahas@ukdw.ac.id



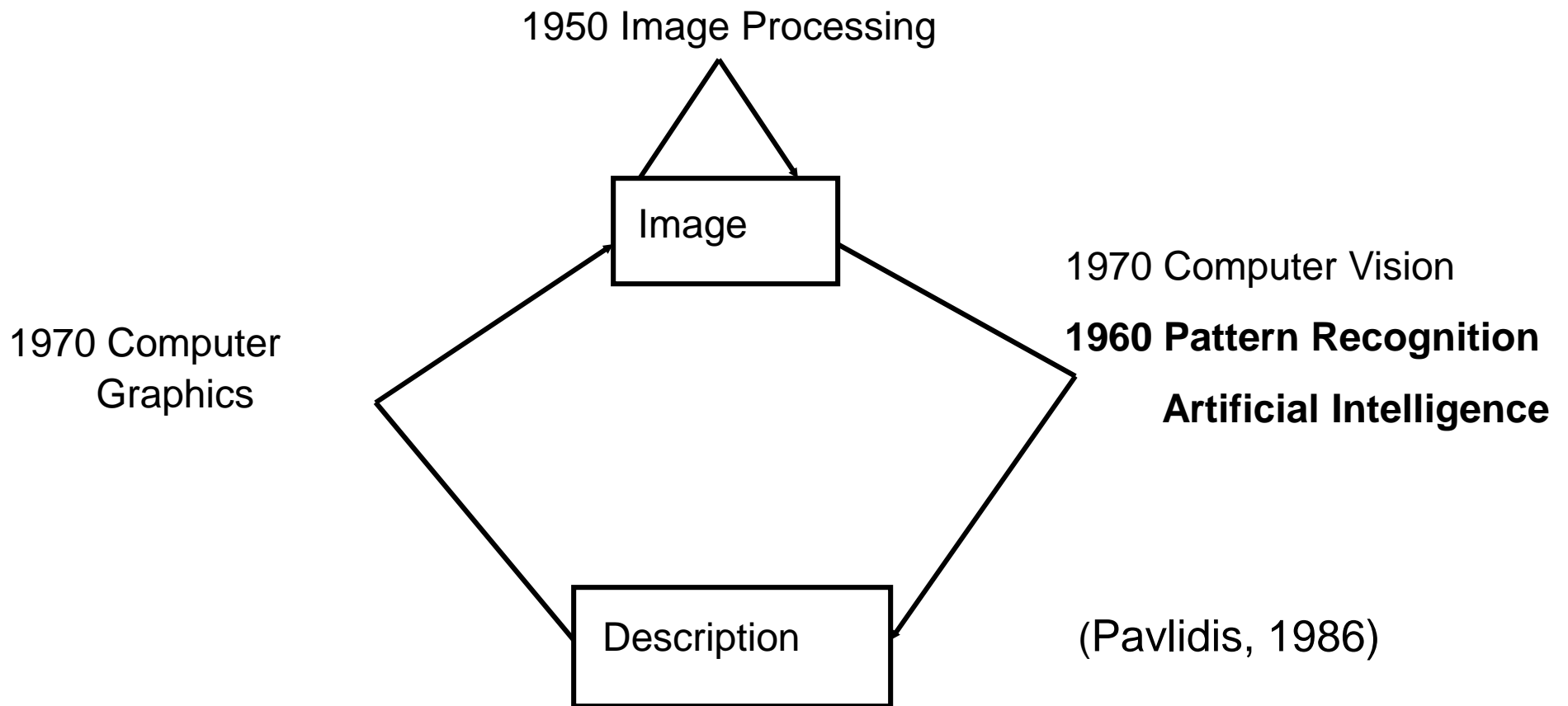
Pengantar Pengolahan Citra Digital

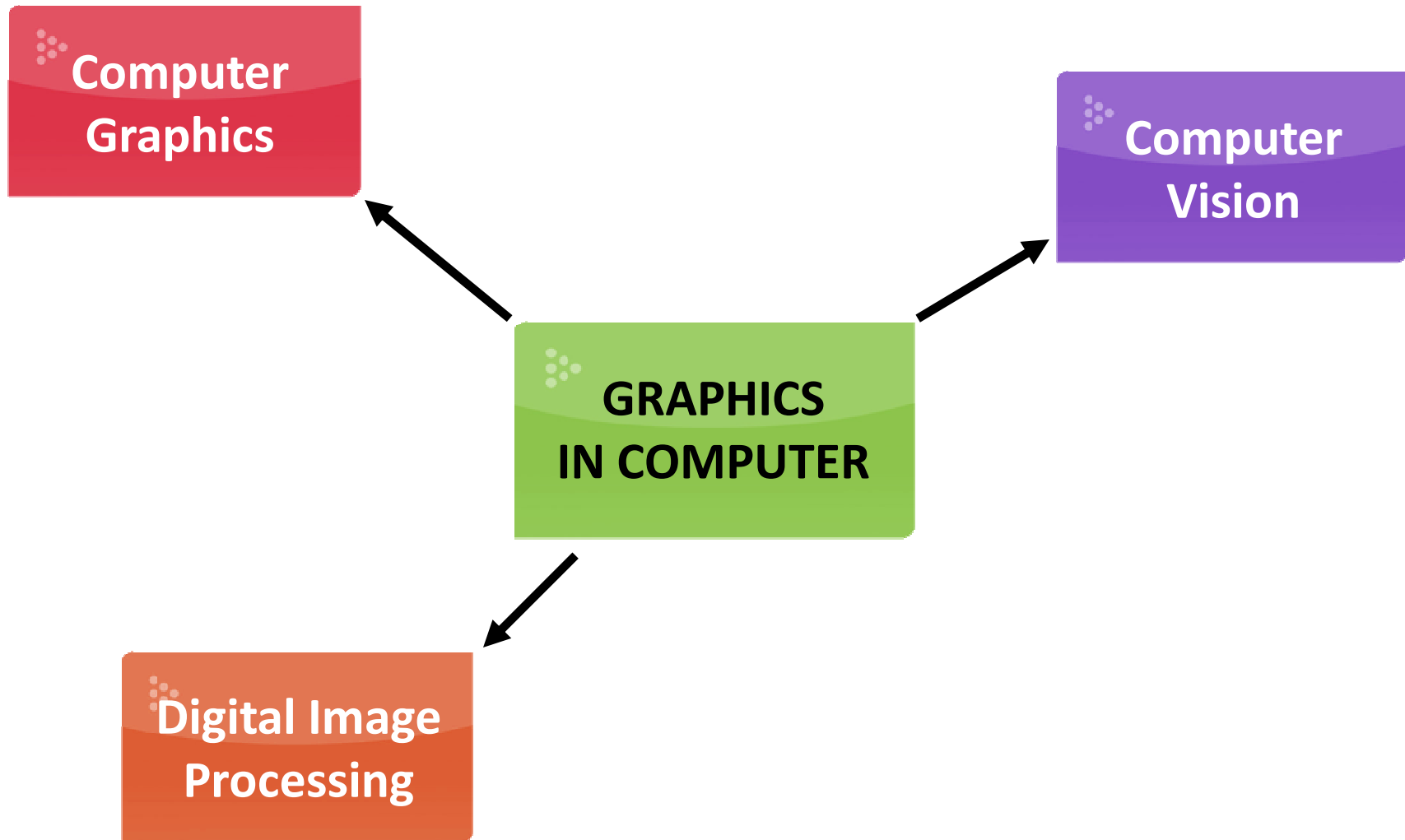
1

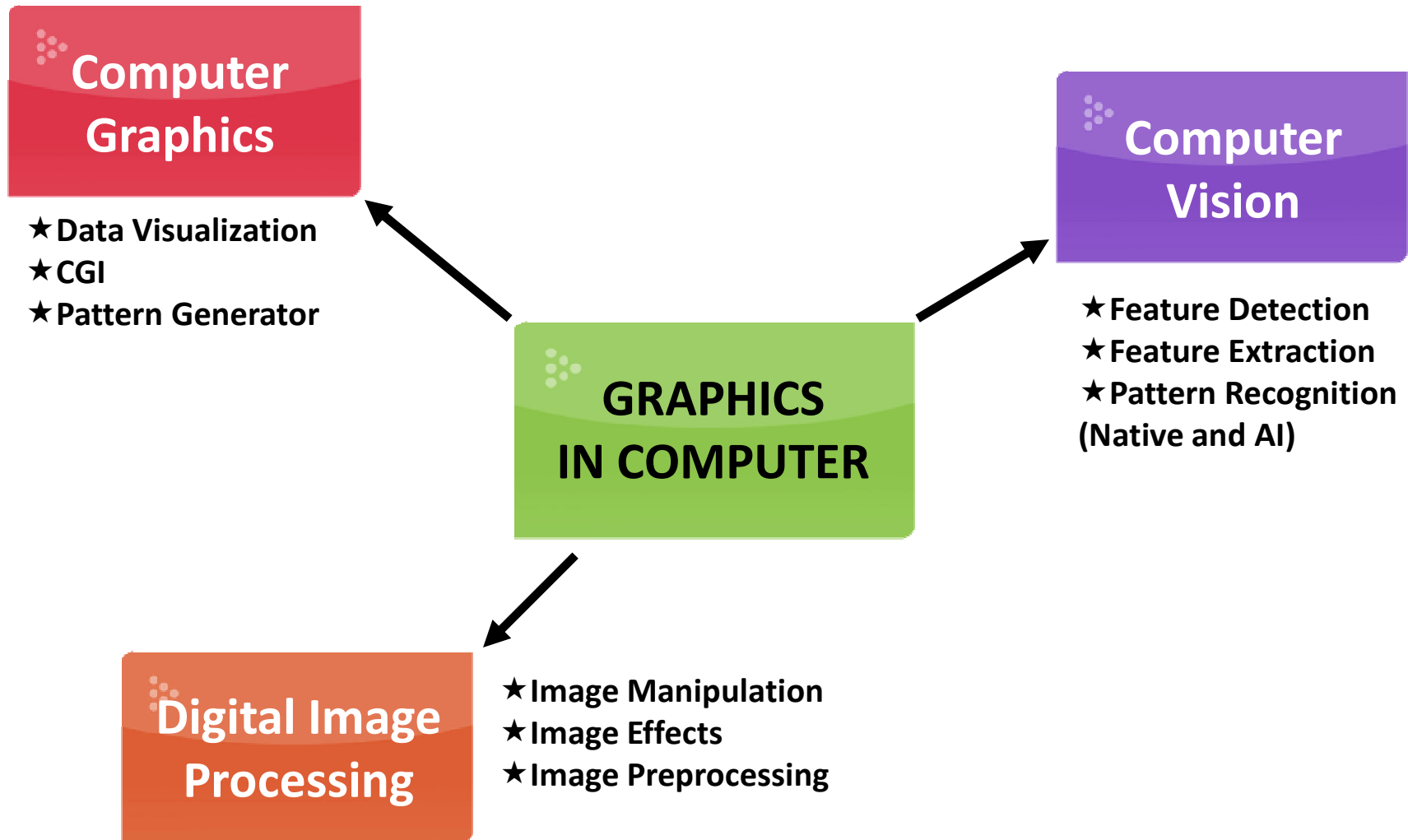


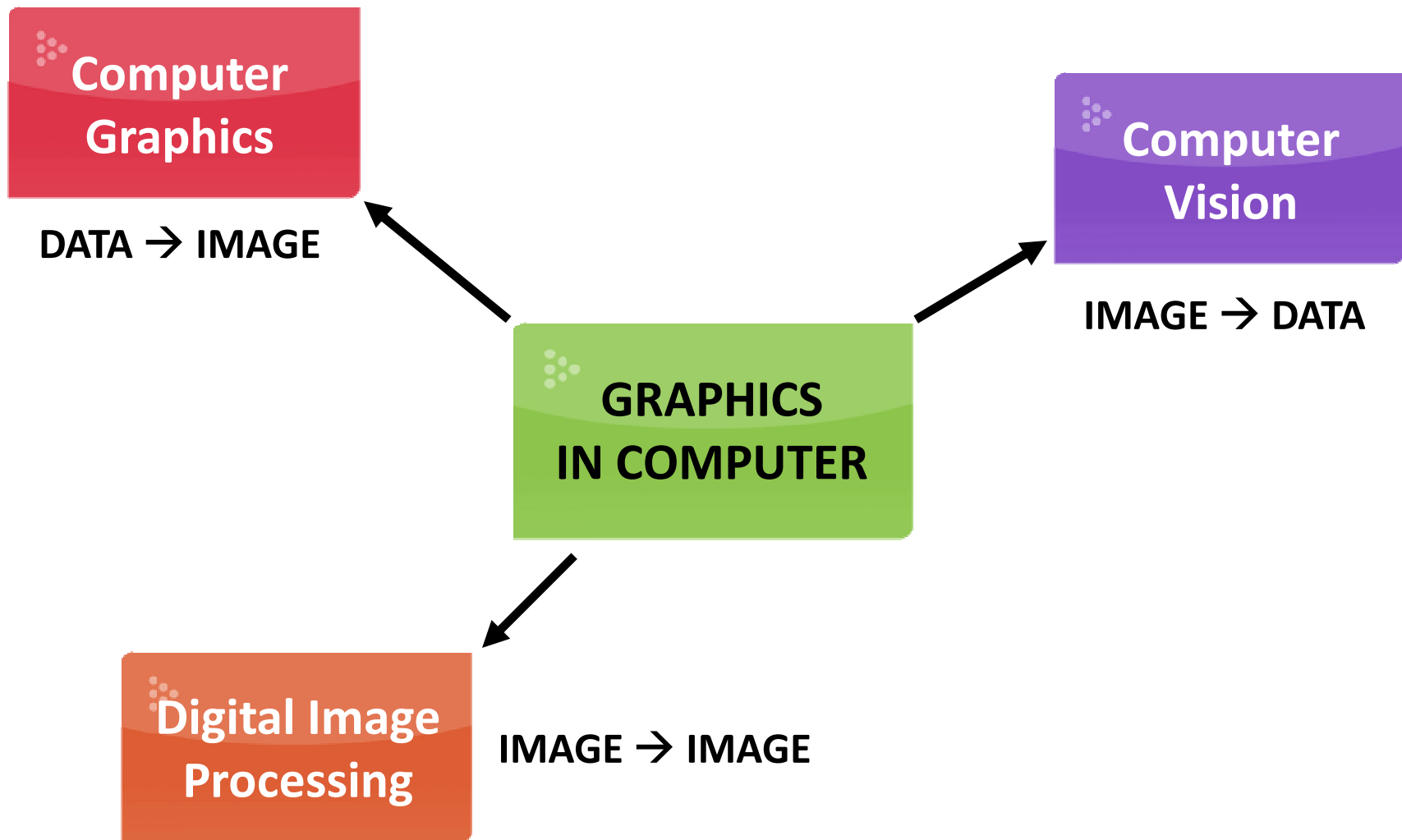


PENGOLAHAN CITRA DIGITAL







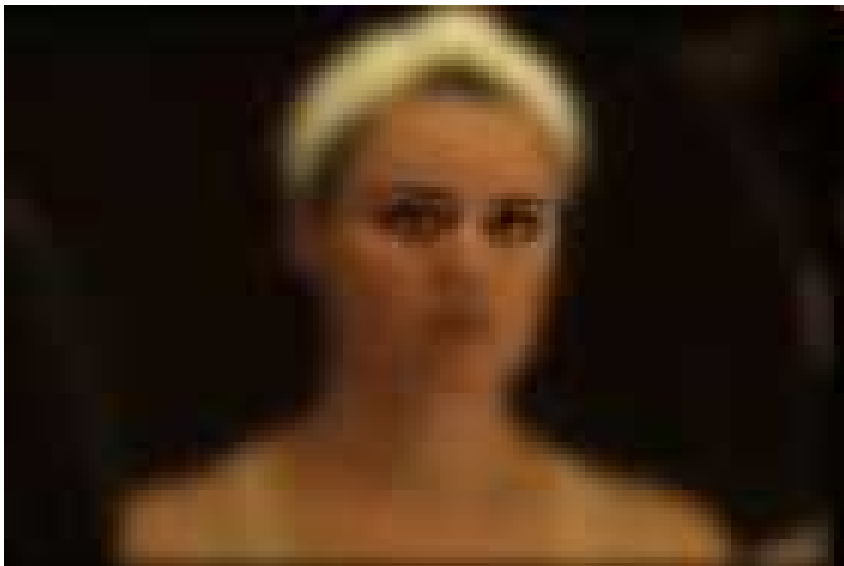




Digital Image Processing:

Input: pixels, output: pixels.

Manipulate existing images to achieve desired visual results (image correction, visual effects, transparency, image stitching)

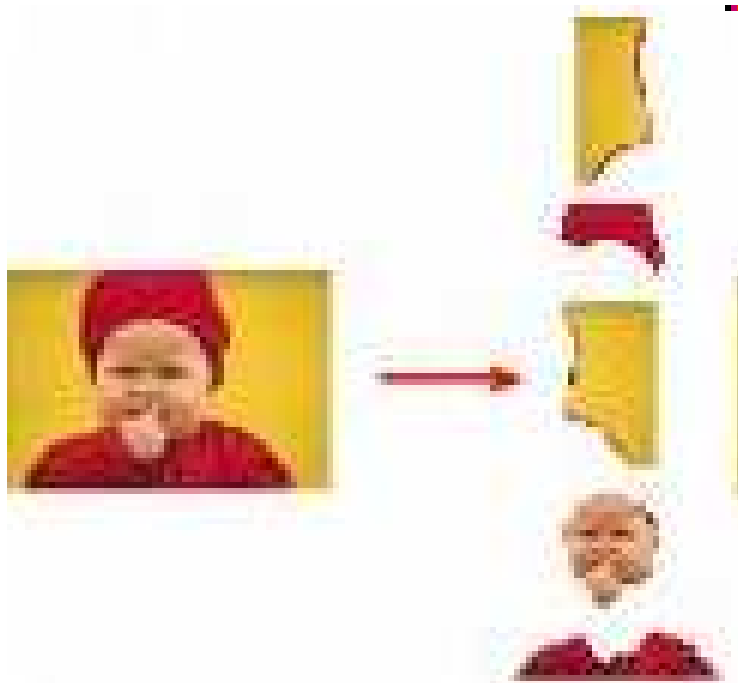




Computer Vision:

Input: pixels, output: data.

Read images, manipulate if necessary and interprets it (segmentation, thinning, edge detection, isolation, properties extraction)

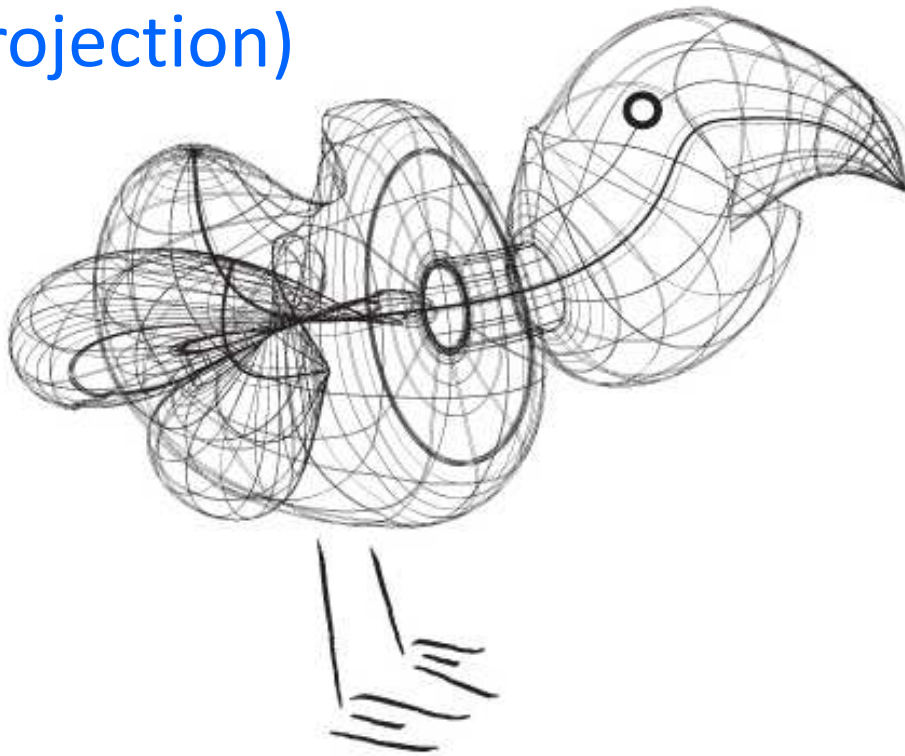




Computer Graphics:

Input: data, output: pixels.

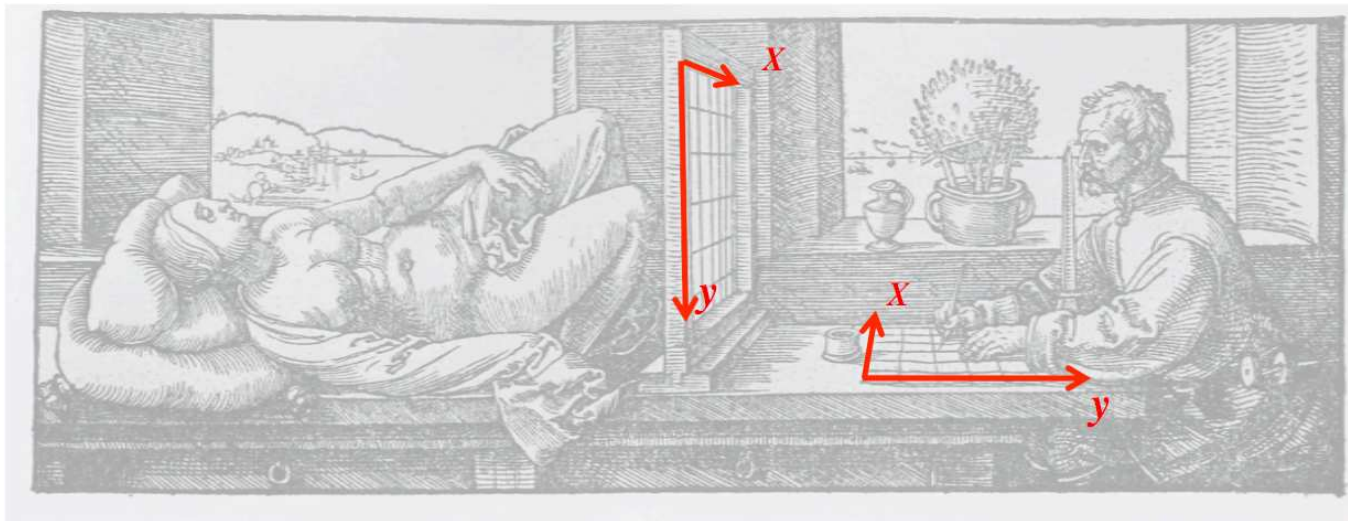
Create, plot and manipulate images using data to render **analytic** visual result (image primitives, transformations, fractals, 2D and 3D planar projection)





APA ITU CITRA (IMAGE)?

- Citra: sebuah representasi visual dalam bentuk fungsi $f(x,y)$ di mana f adalah kecerahan (atau warna) pada titik (x,y)
- Sebagian besar citra didefinisikan dalam bentuk segi empat. Bersifat kontinu dalam ruang dan amplitudo





APA ITU CITRA DIGITAL?

- Citra Digital: sampel diskret $f[x,y]$ yang merepresentasikan citra kontinu $f(x,y)$
- Setiap elemen dari senarai dua-dimensi $f[x,y]$ disebut pixel atau pel (dari „picture element“)



200x200



100x100



50x50



25x25



DARI MANA CITRA DIGITAL DIDAPAT?

- Kamera, scanner, sensor (obtained)
- Bitmap drawing software (created)
- Mainstream formats:
BMP, JPG, PNG,
GIF, TIFF, RAZ

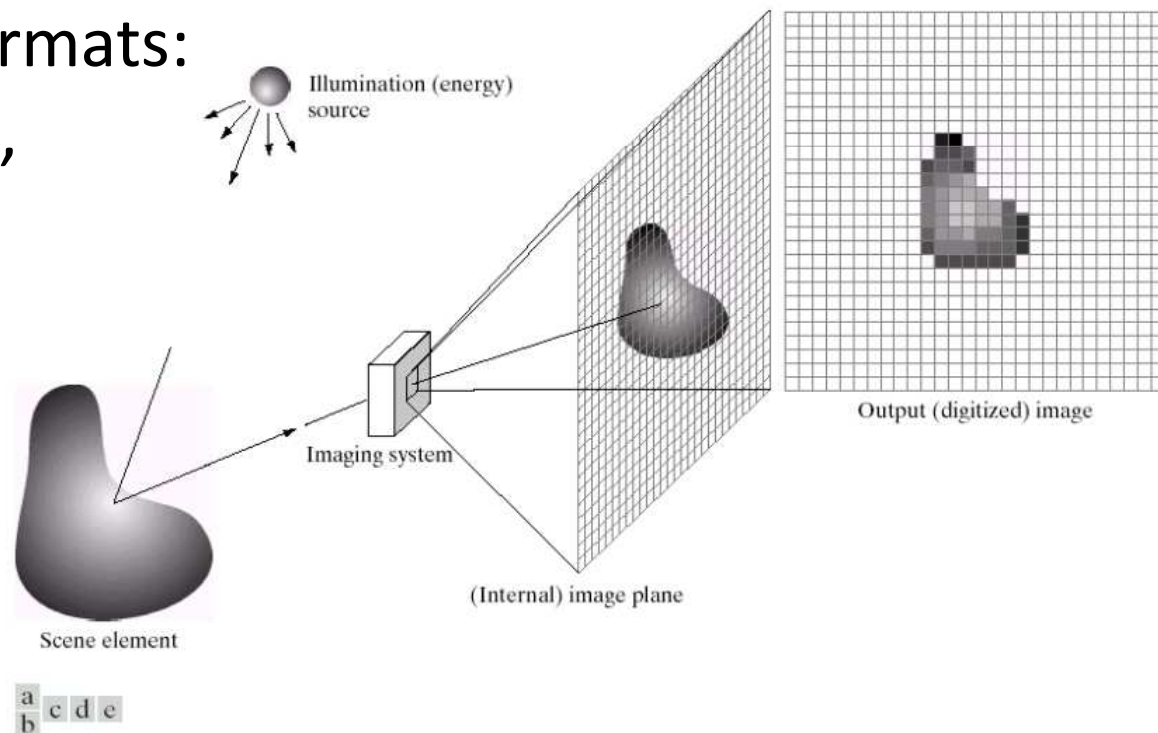


FIGURE 2.15 An example of the digital image acquisition process. (a) Energy (“illumination”) source. (b) An element of a scene. (c) Imaging system. (d) Projection of the scene onto the image plane. (e) Digitized image.



KOMPONEN WARNA CITRA DIGITAL

Monochrome image

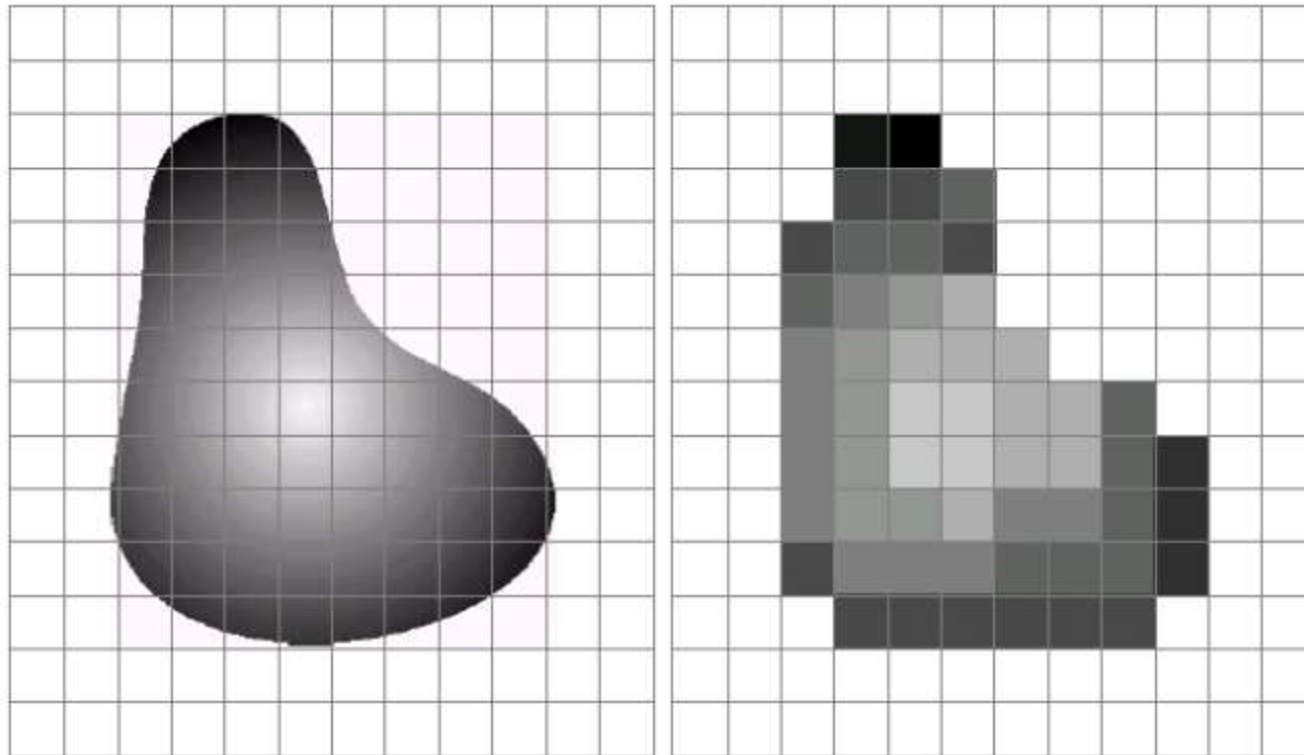
$$R[x,y] = G[x,y] = B[x,y]$$

20 μm

Red $R[x,y]$ Green $G[x,y]$ Blue $B[x,y]$



PROSES KUANTISASI



a b

FIGURE 2.17 (a) Continuous image projected onto a sensor array. (b) Result of image sampling and quantization.



REPRESENTASI CITRA DIGITAL

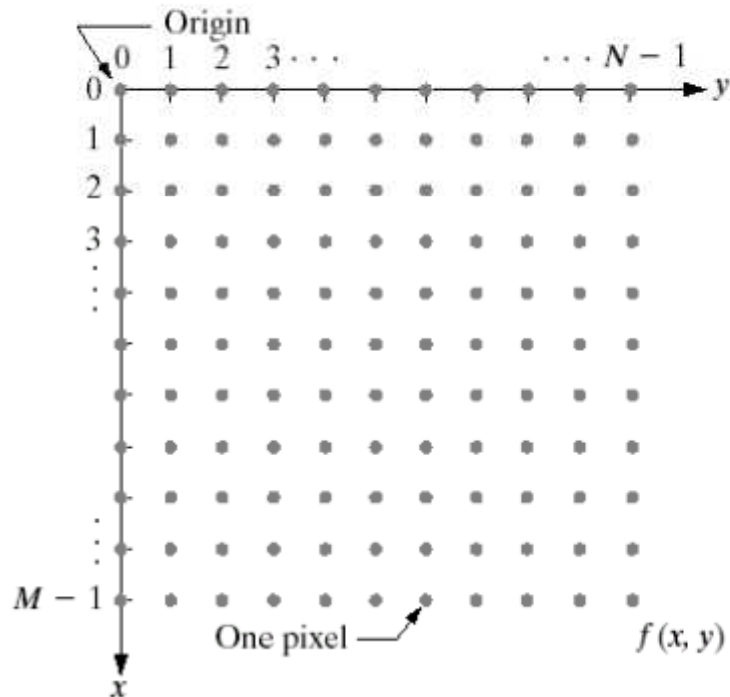


FIGURE 2.18

Coordinate convention used in this book to represent digital images.



RESOLUSI SPASIAL CITRA

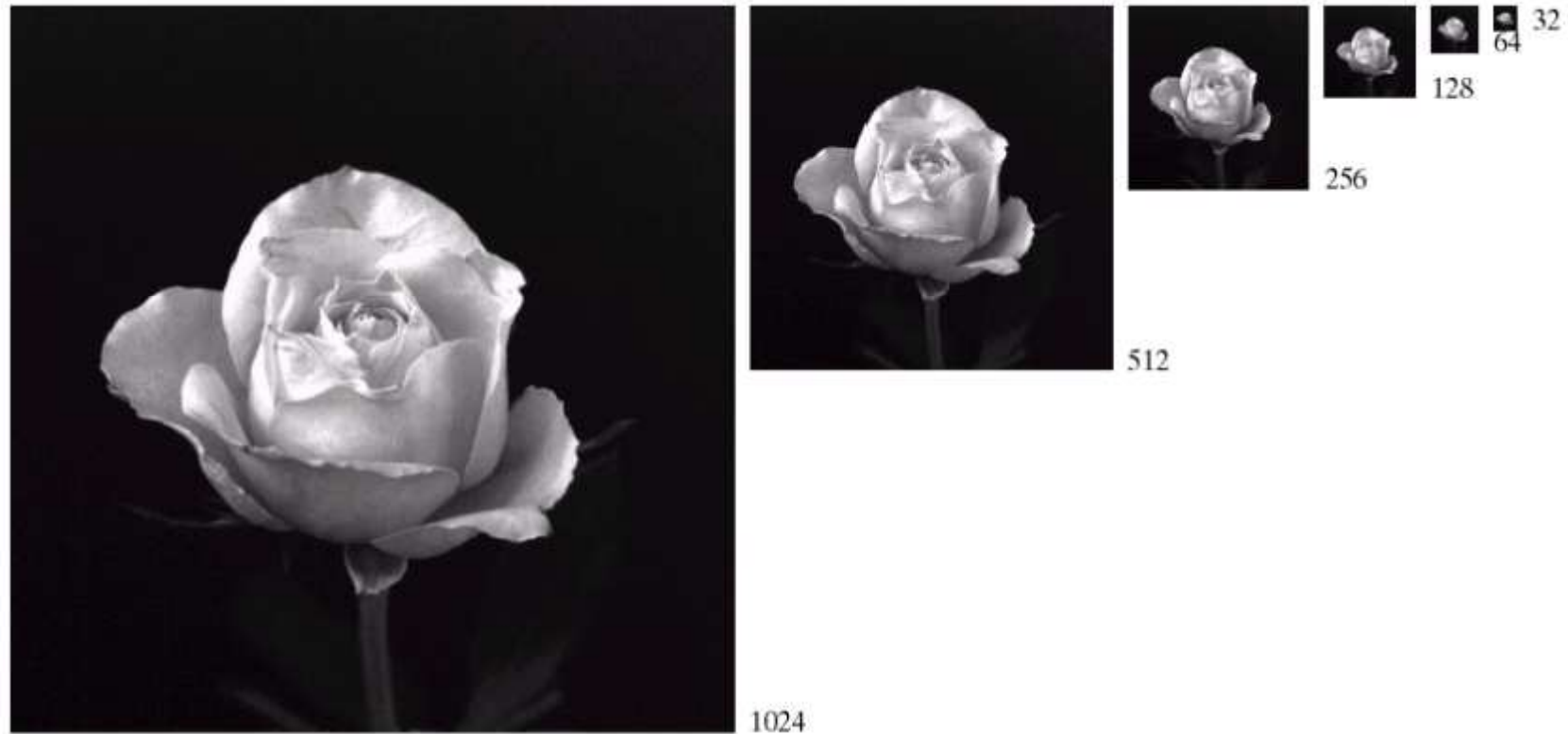
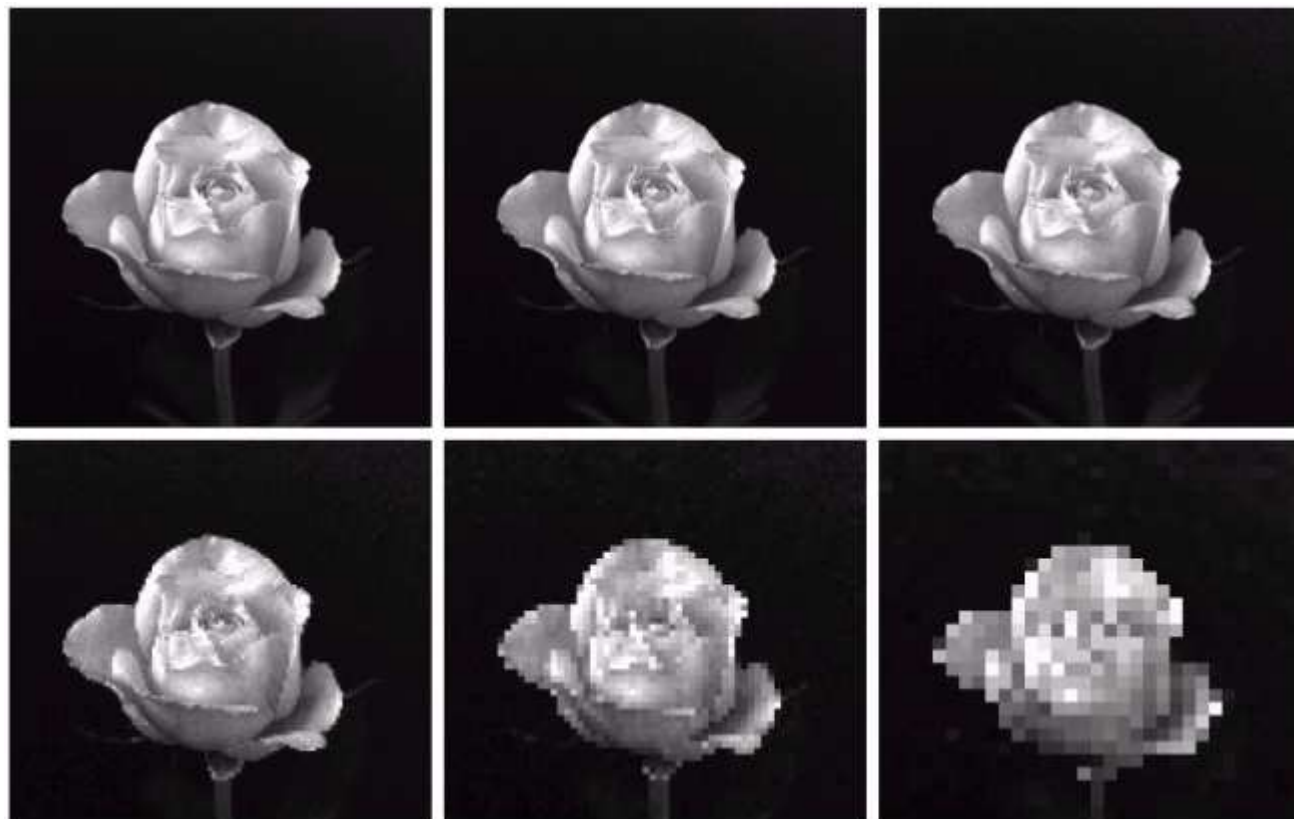


FIGURE 2.19 A 1024×1024 , 8-bit image subsampled down to size 32×32 pixels. The number of allowable gray levels was kept at 256.



RESOLUSI SPASIAL CITRA





MENGAPA PERLU MEMPROSES CITRA?

- 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



MENGAPA PERLU MEMPROSES CITRA?

- Enhance and restore images
 - Touch up personal photos
 - Color enhancement for security screening
- Preparation for Recognition
 - Read 2-d bar codes
 - Character recognition
 - An essential step in Computer Vision!

And many more... so ubiquitous!



IT GOES BEYOND ACNE REMOVING!

- Photography: Image Stitching





IT GOES BEYOND ACNE REMOVING!

- Effects: Image Morphing





IT GOES BEYOND ACNE REMOVING!

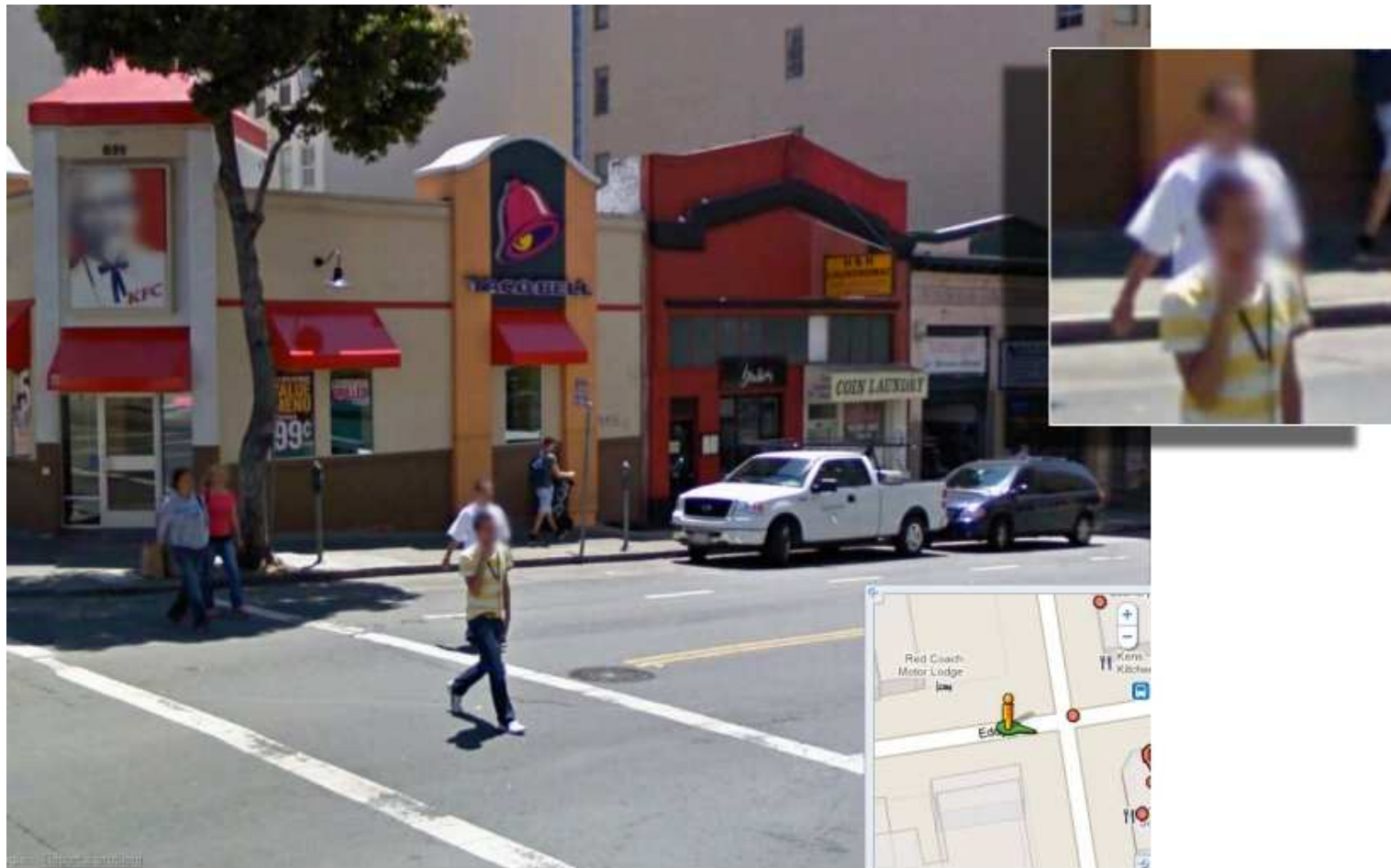
- Computer vision preprocessing: Face Detection





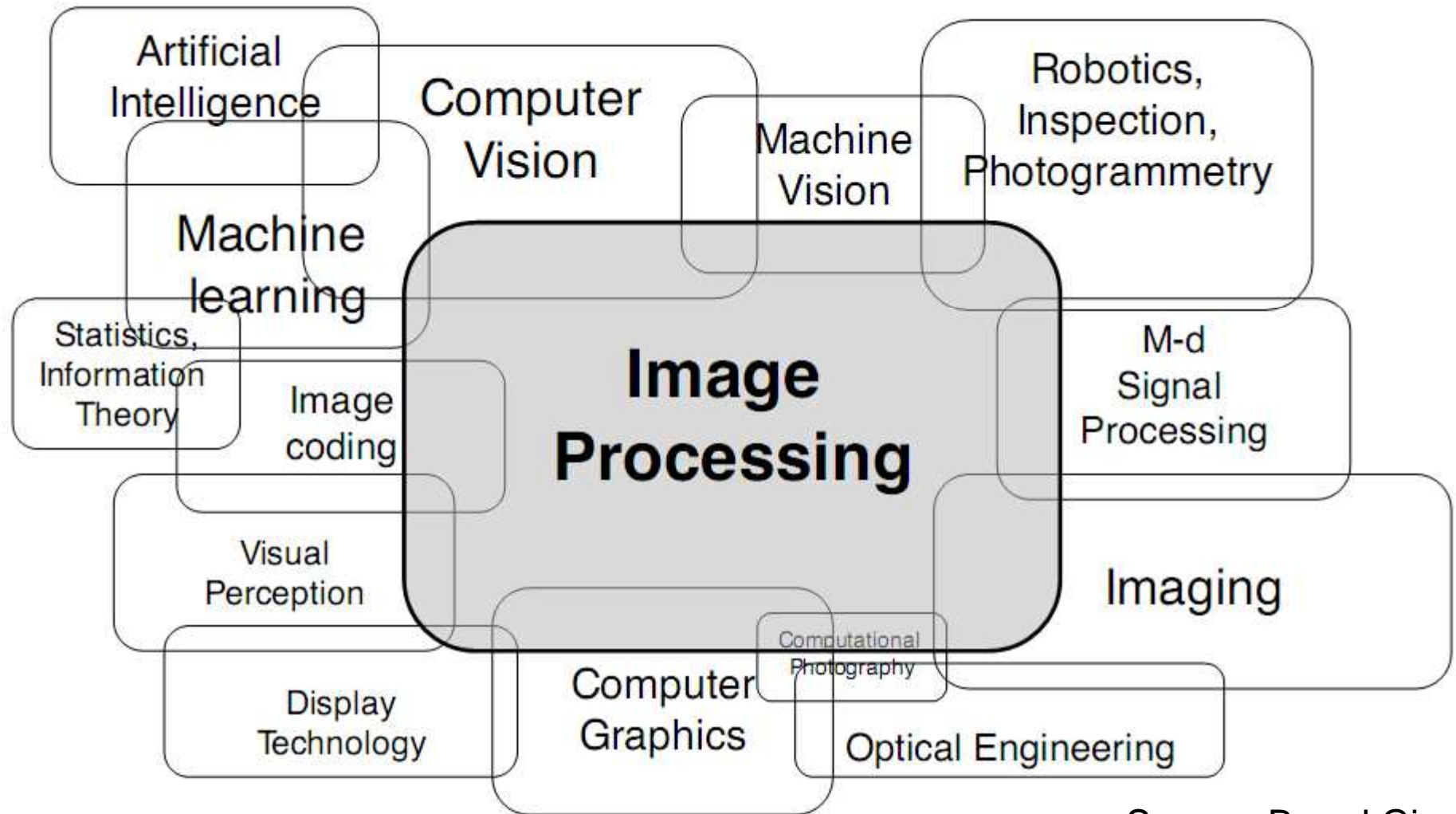
IT GOES BEYOND ACNE REMOVING!

- Security: Face Detection + Blur





... AND FAR MORE



Source: Bernd Girod



THAT'S ALL FOLKS!

- Sampai jumpa minggu depan
 - Sempatkanlah membaca buku Gonzalez bab 1 dan 2 (ada di perpustakaan) sebagai dasar mata kuliah ini.
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- Sekian dan terima kasih. Silakan jika ada pertanyaan.