

# Digital Image Processing 개요

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# 학습 내용

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- Computer Imaging 소개
- Pattern Recognition 개요
- Image Processing 개요

# Computer Imaging

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- Acquisition and processing of visual information by computer
- Divided into two primary application areas:
  1. Computer vision
  2. Image processing
- With **image analysis** being a key component in the development and deployment of both

# Image Computing

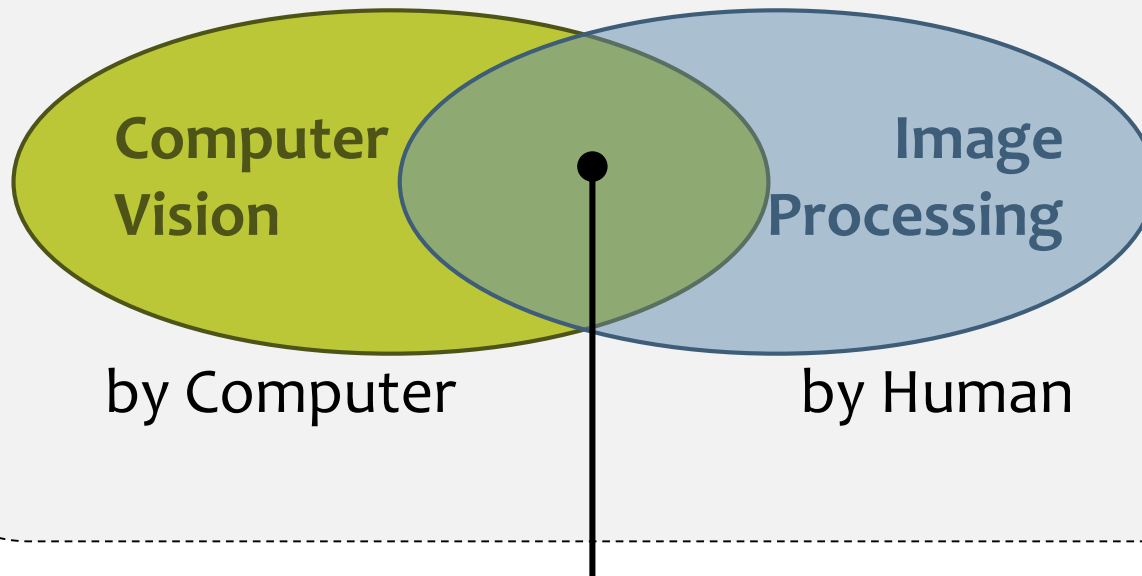
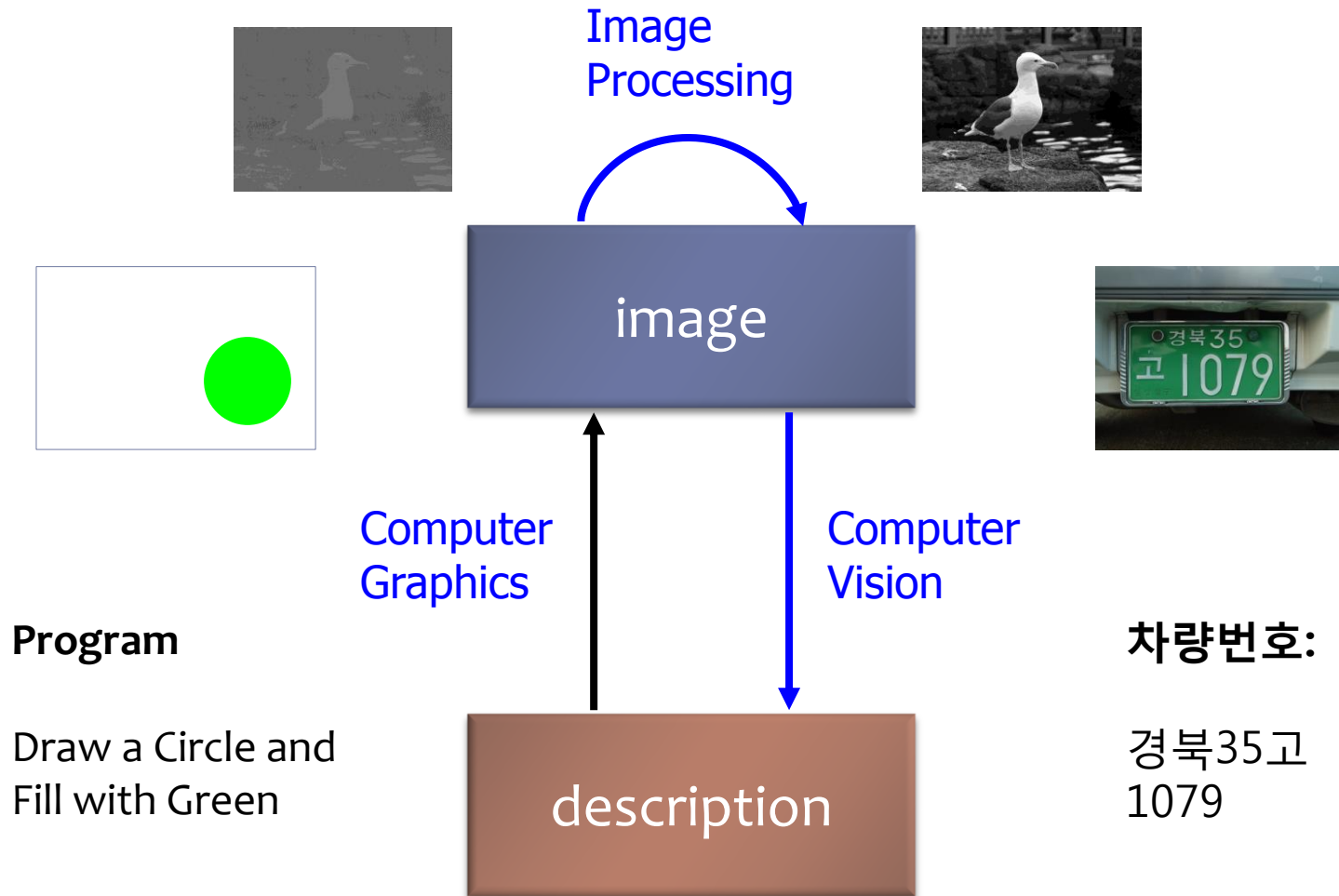


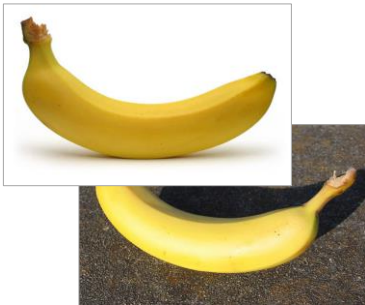
Image  
Analysis

# Related Fields to Image Computing



# Pattern Recognition

Input object(pattern)를 주어진 algorithm에 따라 category나 class로 classification하는 과정



무슨 과일인가?

Pattern Recognition

**PATTERN RECOGNITION**

*Pattern Recognition*

무슨 글자인가?

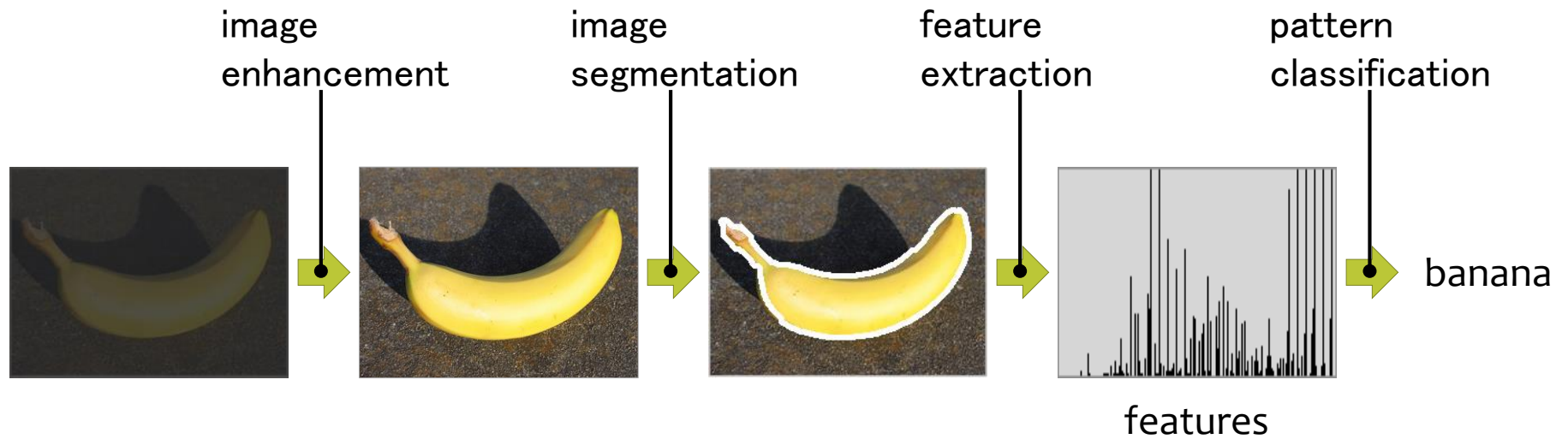
( 키, 몸무게, SGOT, SGPT, 혈당,  
높은 혈압, 낮은 혈압)

=

( 169, 71, 18, 26, 94, 130, 80)

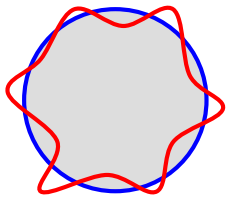
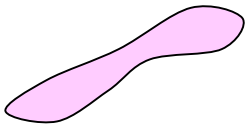
정상인가?

# pattern recognition 절차

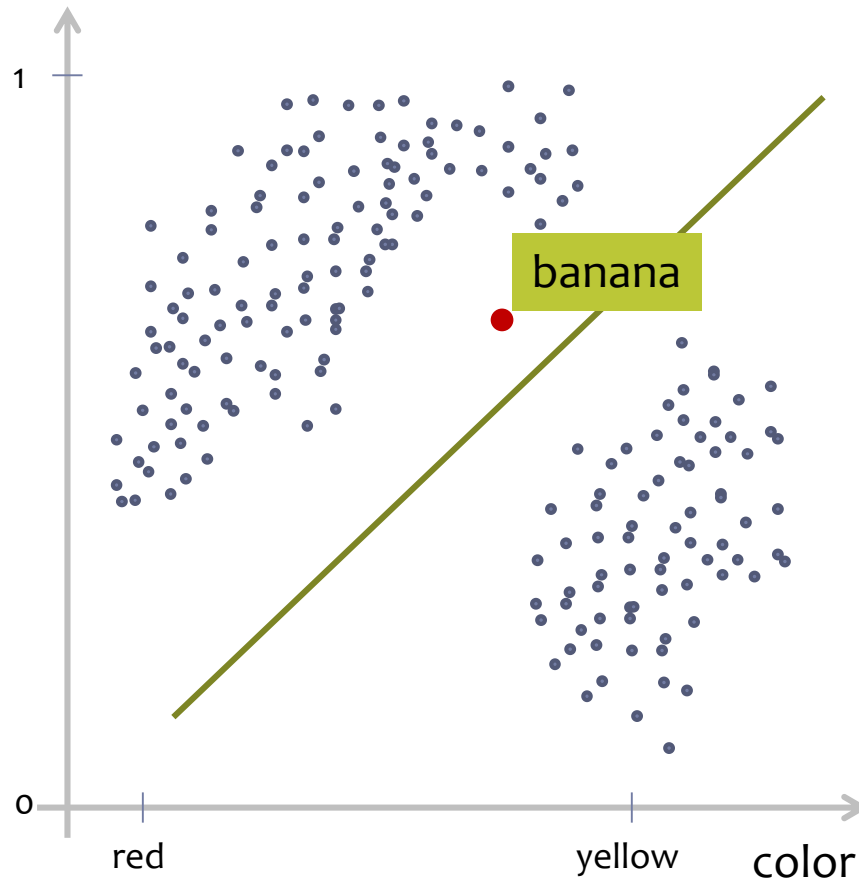


$$T = 4\pi \left( \frac{A}{P^2} \right)$$

$$4\pi \left( \frac{\pi r^2}{(2\pi r)^2} \right) = 1$$



thinness  
ratio





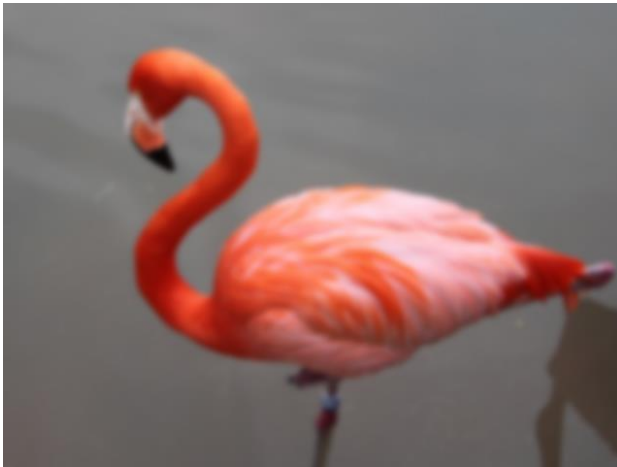
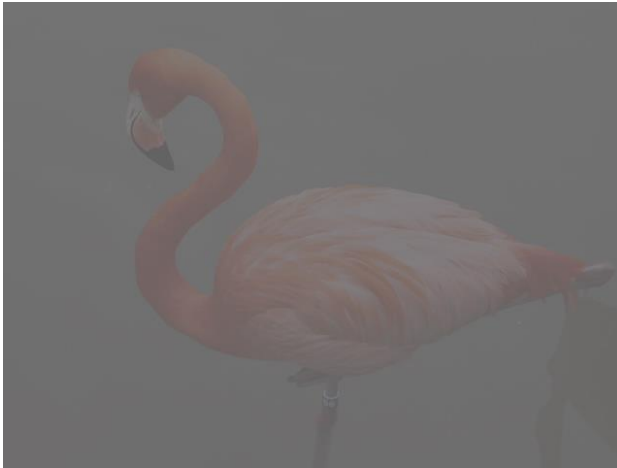
# Image Processing 개요

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- 인간이 사용하기 편하도록 컴퓨터를 사용하여 기존 영상을 개선하거나 수정하는 학문 분야  
(Images are to be examined and acted upon by people)
- Fields of image processing
  - *image enhancement*
  - *image segmentation*
  - *image transforms*
  - *image compression*

# image enhancement

To improve an image visually by using knowledge of the human visual system's response





## image segmentation

To find regions that represent objects or meaningful parts of object

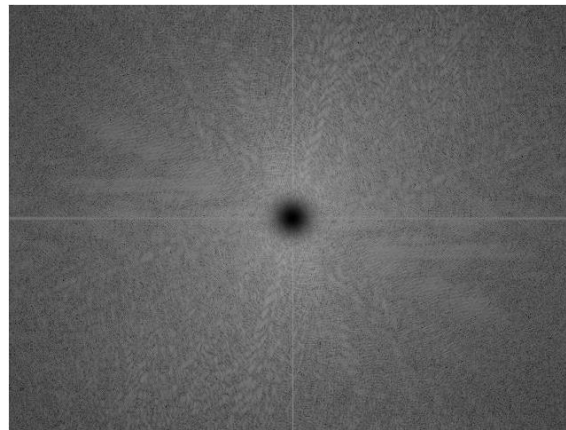
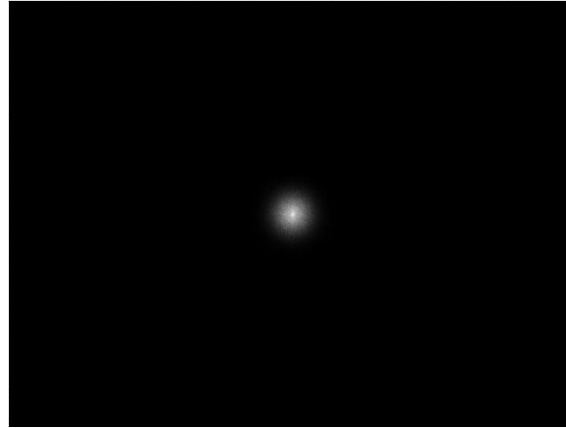


# image transforms

To map the given data into a different mathematical space via a transformation equation



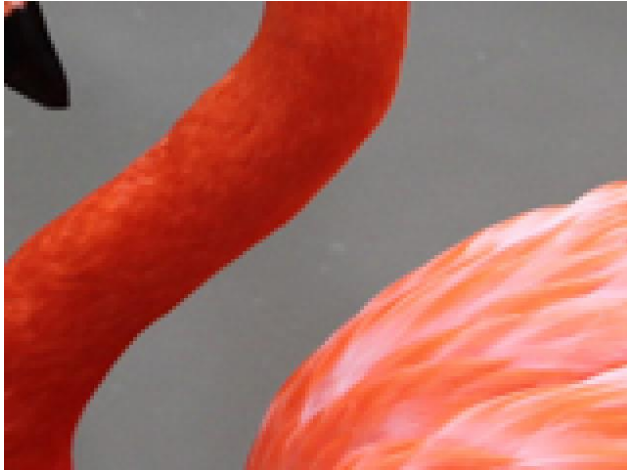
FFT



# image compression

To reduce the typically massive amount of data needed to represent an image

$$640 \times 480 \times 3 = 900 \text{ Kbytes}$$



200 Kbytes (22%)



45 Kbytes (5%)



30 Kbytes (3%)





- Computer Imaging

- Acquisition and processing of visual information by computer
- Computer vision, Image processing → image analysis

- Pattern Recognition

- Input object(pattern)를 주어진 algorithm에 따라 category나 class로 classification하는 과정
- Image enhancement → image segmentation → feature extraction → pattern classification

- Image Processing

- 인간이 사용하기 편하도록 컴퓨터를 사용하여 기존 영상을 개선하거나 수정하는 학문 분야
- image enhancement, image segmentation, image transforms, image compression

# Reference

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- Scott E Umbaugh, **Computer Imaging**, CRC Press, 2005
- 오일석, **패턴인식**, 교보문고, 2008