Image Processing   Course

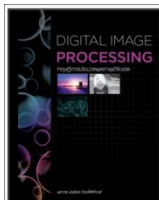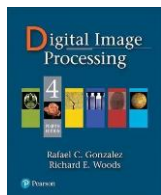**ผู้สอน:**

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DIPLab: ECC-509

TEXTBOOK:

1) R. C. Gonzalez and R. E. Woods, **Digital Image Processing**, Prentice Hall, New Jersey
2) R.C. Gonzalez, R.E. Woods, Steven L. Eddins, **Digital Image Processing using MATLAB**, Prentice Hall, New Jersey
3) **Digital Image Processing**, ผศ.ดร.อรฉัตร จิตต์โสภักตร์ (ทฤษฎีการประมวลผลภาพดิจิตอล)

Course Information

Course Information

Grading Policy

Lab & In class practice	40%
Assignment	30%
Final exam	30%

Introduction

- *"One picture is worth more than ten thousand words"*

  - Anonymous

An image is worth more than thousand words

Q1: ตามองครั้งแรกเห็นอะไรในภาพบ้าง
Q2: อะไรคือวัตถุที่สนใจ และ event ที่เกิดขึ้น
Q3: อะไรคือความหมายที่ซ่อนอยู่ในภาพ

Q: เราจะทำอย่างไร ที่จะทำให้ **Computer สามารถ** สร้าง **Keyword** ได้ใกล้เคียงกับ Human Meaning
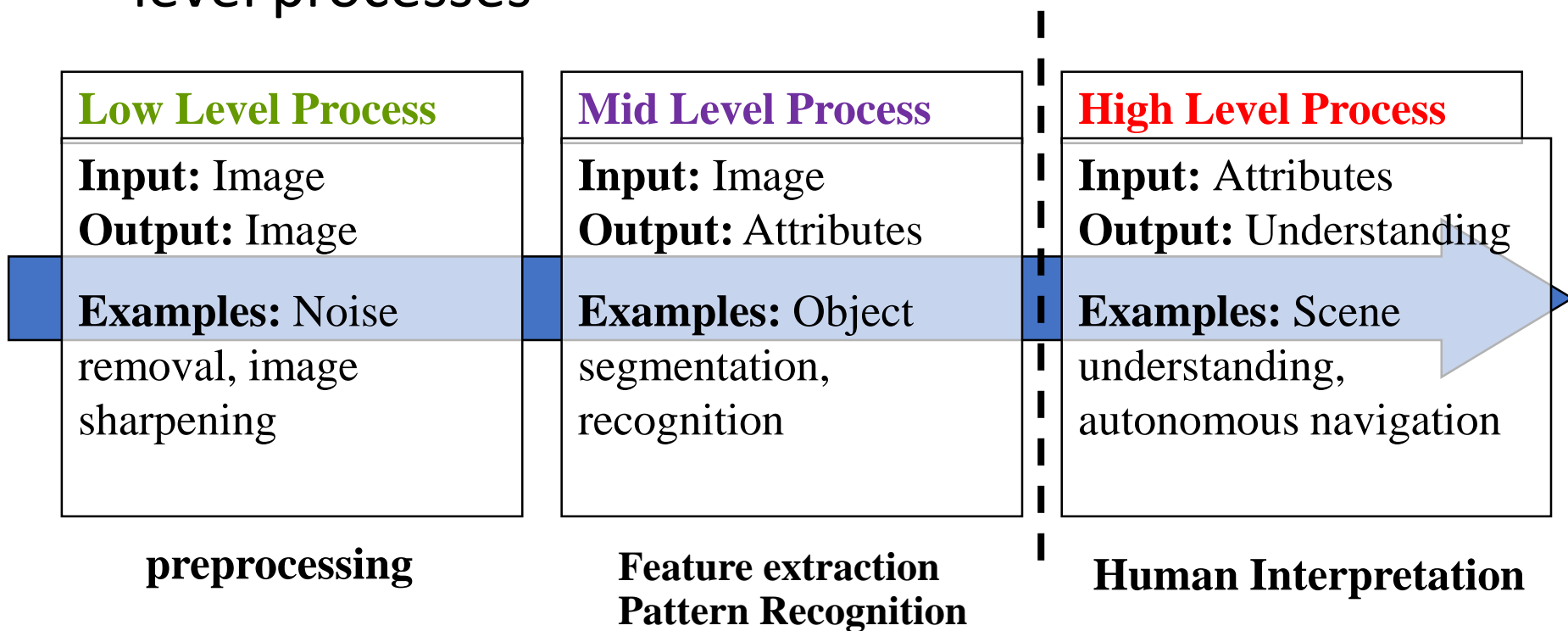
A: โจทย์นี้ นำมาซึ่งงานวิจัยด้าน

Image Processing

Computer Vision

Machine Learning / AI / Deep Learning

What is DIP?

- The continuum from image processing to computer vision can be broken up into low-, mid- and high-level processes

Low Level Process	Mid Level Process	High Level Process
Input: Image **Output:** Image **Examples:** Noise removal, image sharpening	**Input:** Image **Output:** Attributes **Examples:** Object segmentation, recognition	**Input:** Attributes **Output:** Understanding **Examples:** Scene understanding, autonomous navigation
preprocessing	**Feature extraction Pattern Recognition**	**Human Interpretation**

Introduction to Image Processing Topics

Introduction to Image Processing Topics

| 0 **From Real world to Virtual World**	• From Real world to Virtual world (Computer)
	    • Image Acquisition and Digitization
	    • Image File Format

1 **Preprocessing**	• Preprocessing
	    • Enhancement
	    • Restoration

2 **Getting Object Attributes**	• Objects
	    • Segmentation
	    • Attributes

3 **Understanding**	• Understanding scene and event
	    • Assumptions Simple understanding
	    • Learning from knowledge

Image Acquisition and Digitization

0	• From Real world to Virtual world (Computer)
From Real world to Virtual World	• Image Acquisition and Digitization • Image File Format
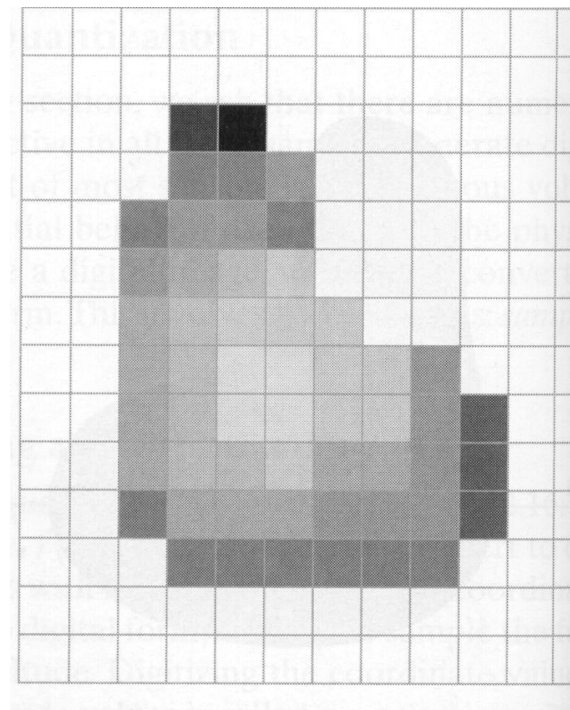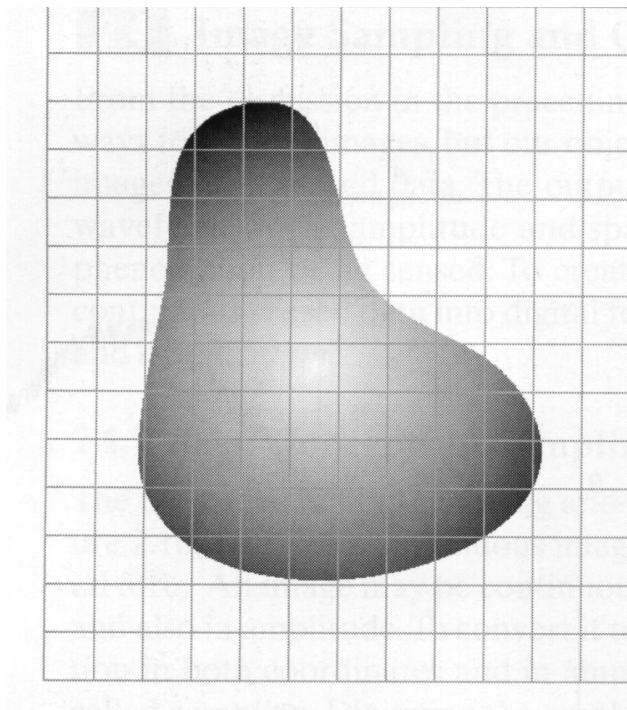
การได้มาซึ่งภาพดิจิตอล

Image File Format

0

From Real world to Virtual World

- From Real world to Virtual world (Computer)
  - Image Acquisition and Digitization
  - Image File Format
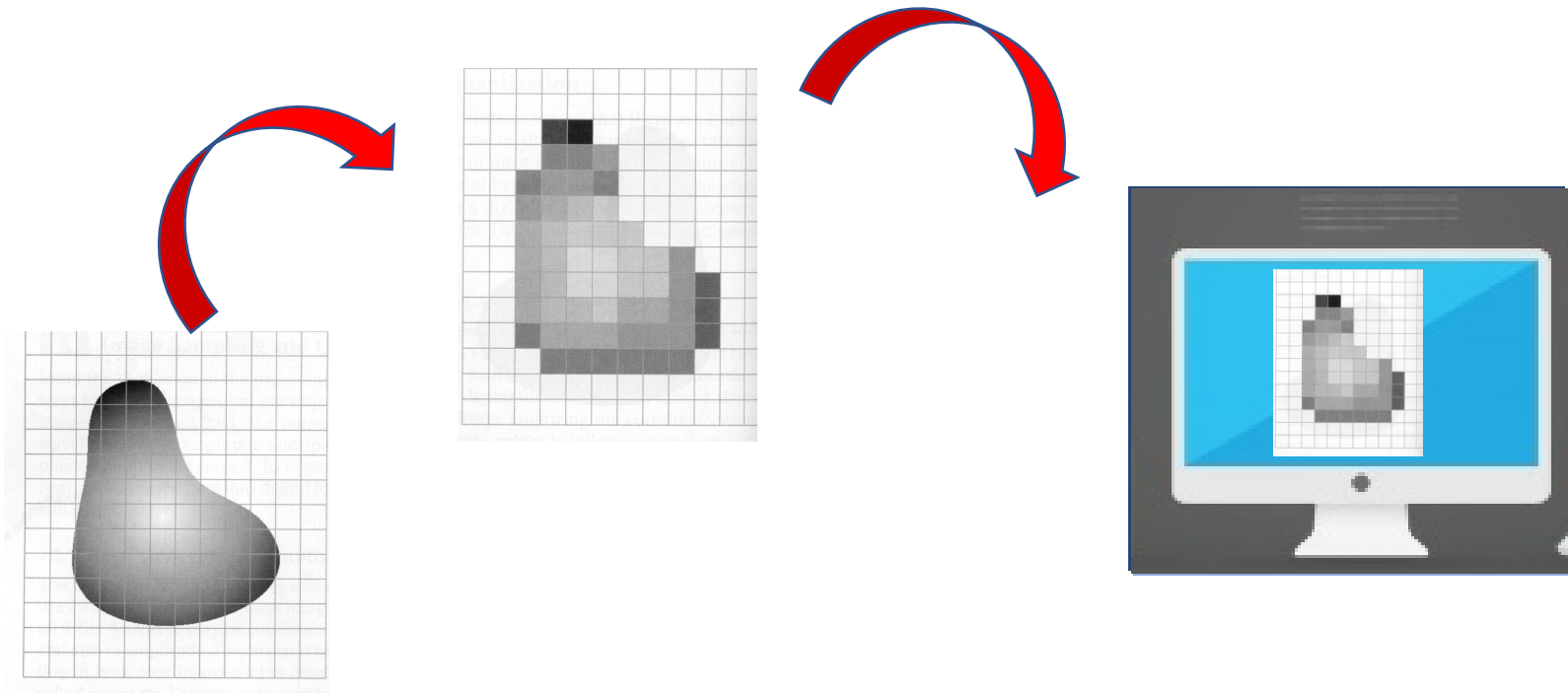
รูปแบบการจัดเก็บ

Image Compression

Original

Lossless Compression
(no errors)
PNG, BMP, GIF

10:1

Lossy Compression
(with errors)
JPEG, JPEG2000, BMP
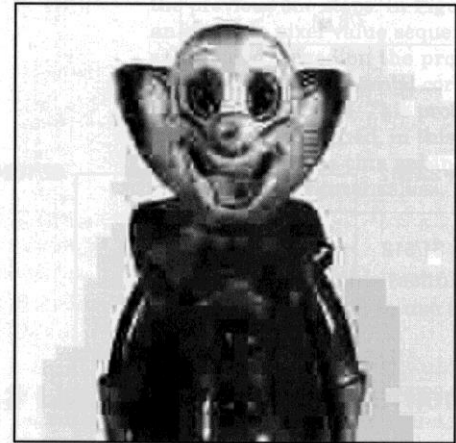
48:1

Image Enhancement

Improve the quality of an image
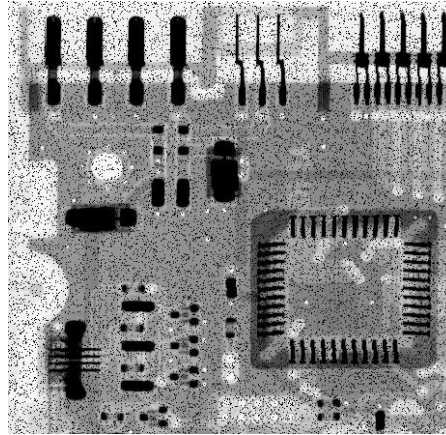

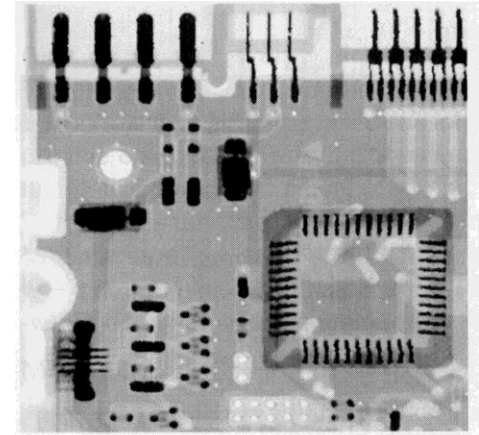Wide Field Planetary Camera 1
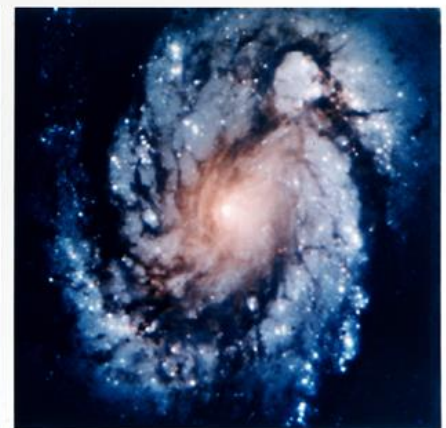
Wide Field Planetary Camera 2

Image Restoration
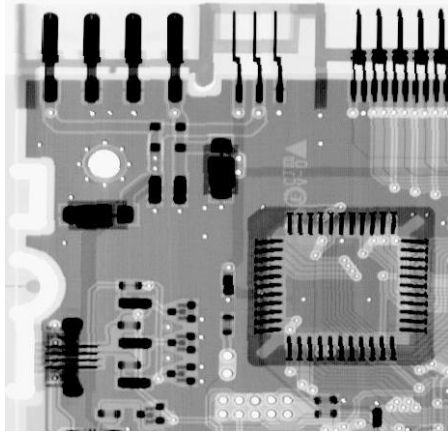
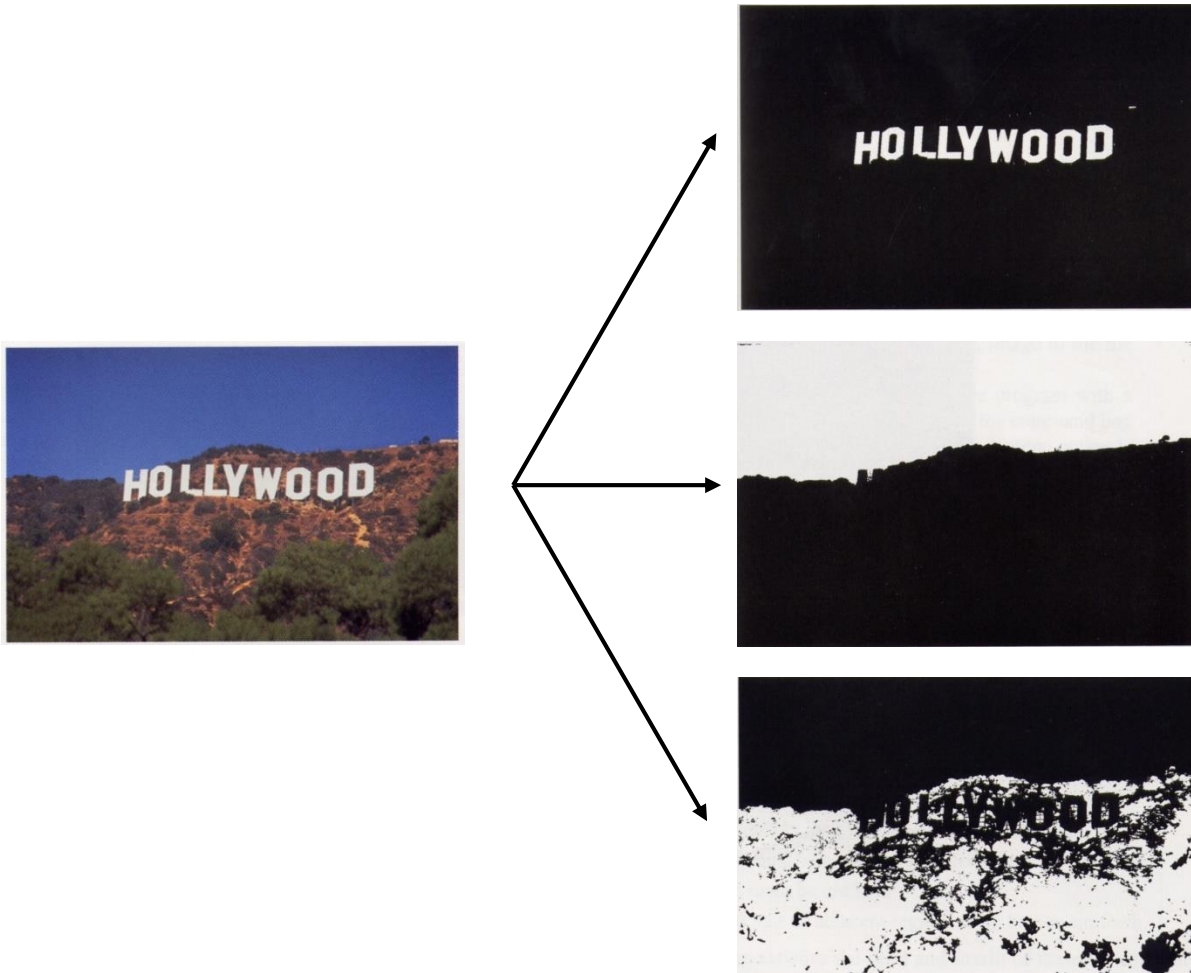Original   Noisy Image   After restoration
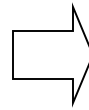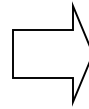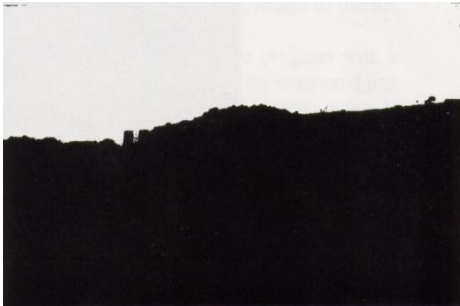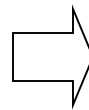
Image Segmentation

Image Analysis

Letters

Sky

Tree & Bush

Learning Topics

- Image Acquisition and Digitization

- Image Preprocessing (Pixel Domain)
  - Pixel intensity correction and filtering
  - Geometric Transformation

- Image Preprocessing (Frequency Domain)

- Image Segmentation

- Image Representation and Description

- Object Classification (CNN)