Introduction to Computer Vision and Its Applications

Course Information

- Lecture: Tuesday (In English)

  English as a Medium of Instruction (EMI Course)
- Lab: 8 times (6:00pm~9:00pm)
- Reference books:
  - R. C. Gonzalez, R. E. Woods, Digital Image Processing, Prentice-Hall
  - Shapiro and Stockman, Computer Vision, Prentice-Hall
- TA:
  - 鄭佳榮 tony900117471005@gmail.com
  - 柳瀚揚 <hankliou891009@gmail.com>

Lab Sessions

- Upload your work after your work is checked by TA
- If you can not finish your work in time, let the TA know your name and make sure you have attended the lab session.
- If you cannot finish the lab in time (before 9:00pm), we accept make-up results within one week and you can get 70% score.
- We do not accept make-up demos if you did not attend the lab sessions.

Grading Policy

- Lab 40%
- Midterm 20%
- Final 20%
- Term Project 20%

Term Project

- Requirement:
  - Live demo
  - Present your work in class
  - Turn in source code and report before Jan. 2 (24:00)
- Team up:
  - 2 persons for each team
  - Submit your group member information via online form
  - Submit the expected title of your work before the date designated by the teaching assistant
- Grading policy (Total 20%)
  - Creativity, Functionality, Completeness: 8%
  - Demo and Oral presentation: 5%
  - Written report: 5%
  - Source Code Comments and Readability: 2%

What is Computer Vision?

- Computer Vision: Computer programs that interpret images
  - acquiring, processing, analyzing, and understanding images

- Humans have developed highly sophisticated skills for sensing their environment and taking actions according to what they observe
  - Recognizing a face,
  - Reading handwriting
  - Understand the behaviors of a human
- Can computers achieve what humans can achieve?
- Or even have abilities beyond human's capabilities?

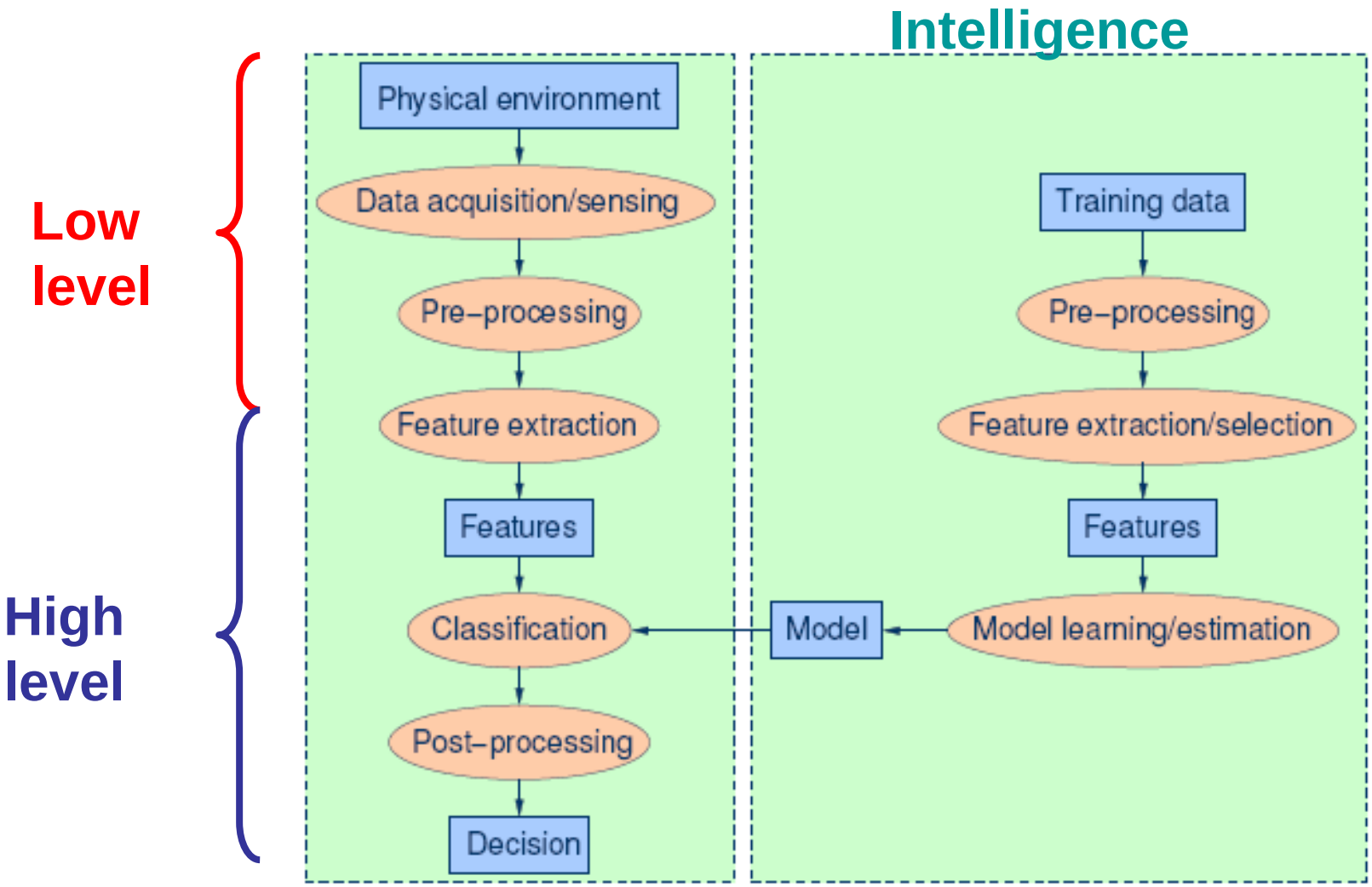
Applications

- Robots
- Organizing information
  - Fingerprint/Palm print/Iris identification
  - Character recognition, Handwriting analysis
  - Image Retreival
- Medical diagnosis
- Intelligent Surveillance Systems
  - Behavior Analysis
  - Face detection/recognition
- Intelligent Transportation Systems
- And a lot more…

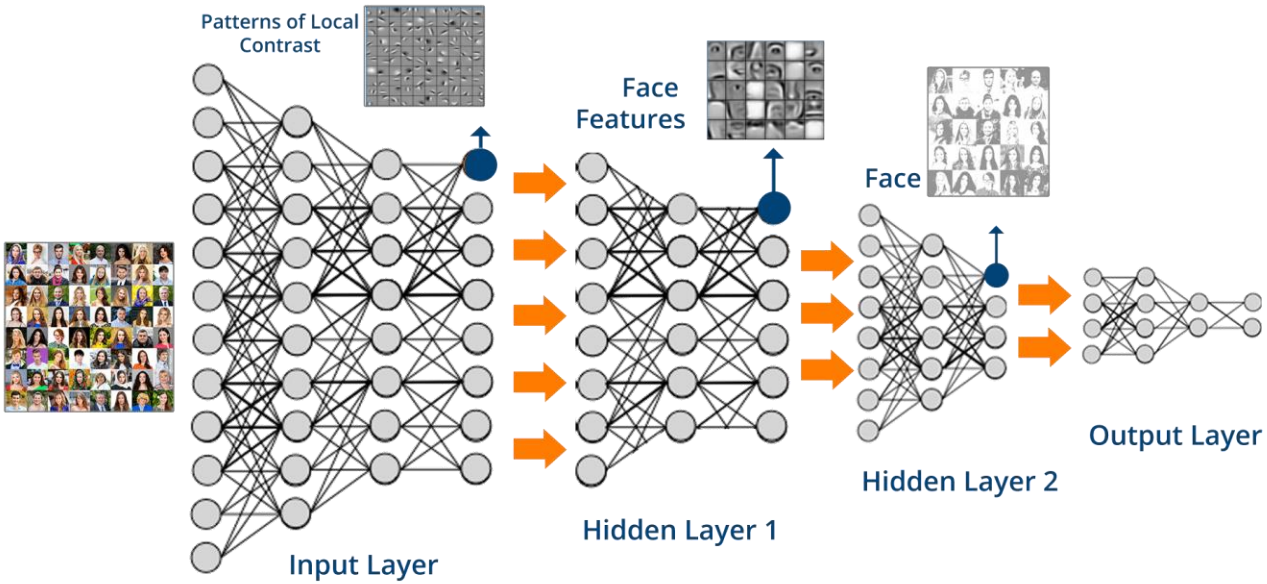
Levels of Computer Vision

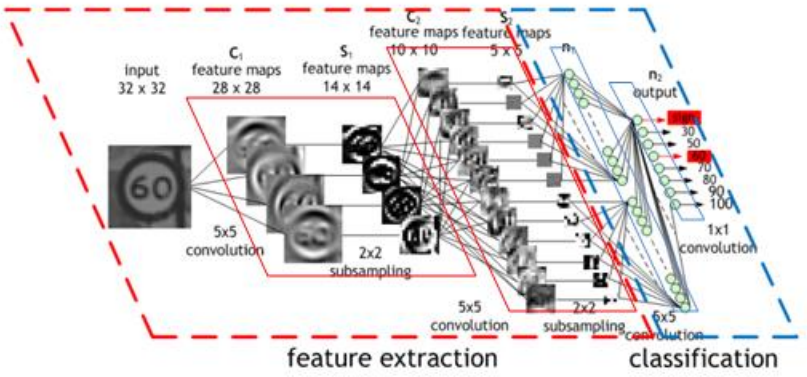
- Low level (image processing)
  - No assumptions about image content
  - Similar algorithms for all images
  - As preprocessing for high level vision
- High level (image understanding)
  - Requires models or domain knowledge
  - Often specialized for particular types of images
  - Techniques from artificial intelligence

Levels of Computer Vision



End to End Architectures





What are the Differences?

- Image Processing
- Computer Vision
- Computer Graphics

Schedule

Date	Lecture	Lab
9/12	Introduction and Course Overview	
9/19	Fundamentals	Lab1: Read/Write Images and Videos (5%)
9/26	Fundamentals and Image Enhancement	Lab2: Image Enhancement (5%)
10/3	Image Enhancement	Lab3: Gray-Level Histogram (5%)
10/10	National Holiday	
10/17	Color Images and Binary Image Analysis	
10/24	Features	Lab4: Skin Color (5%)
10/31	Midterm	
11/7	Features	Lab5: Edge (5%)

Schedule

Date	Lecture	Lab
11/14	Classifiers	Lab6: Morphological Operations (5%)
11/21	Classifiers	Lab7: PCA Ellipse Fitting (5%)
11/28	Applications	Lab8: Semantic Segmentation (5%)
12/5	Applications	
12/12	Project Demo and Presentation	
12/19	Project Demo and Presentation	
12/26	**Final Exam**	
01/02	Due day: Turn in source code and report of final project	