Administrative

- Web page: http://www.research.rutgers.edu/~chan
  su/CS580Web
- Matlab Tutorial on the web page
- No homework today
- CS : category B

History of Computer Vision
The early years (1955-1970)

- Analysis of single images of static scenes
  - 2D images of scene: documents, micrographs, aerial image processing
  - Pattern recognition
- Low-level processing: extraction of important intensity change: edge detection
  - failed to derive useful scene description
- High-level knowledge: introduce additional constraints

1970-1985: Modules and uniqueness

- Marr: vision system is conceptualized as a collection of individual autonomous components, or module
- Low-level vision: extracting simple representation of the image intensity array
  - Edge detection, segmentation into homogeneous region, texture representation
- Middle-level module: recover shapes, colors, spatial locations, and motions of objects
  - Shading, texture, contours, and motion
1985-present: Discontinuities and active vision

- Dealing with discontinuities
  - Segmentation into homogeneous regions + regularization within each region
  - Divide boundary point + nonboundary point
- Active vision
  - Many visual recovery problems become easier if the observer is active; eye movement

1985-present: Recognition and navigation

- Object recognition
  - Matching object description
- Navigation
  - Mobile robot navigation based on known scene structure
  - Autonomous outdoor vehicles
Three states of Computer Vision

- Low-level
  - Image $\rightarrow$ image
- Mid-level
  - Image $\rightarrow$ feature
- High-level
  - Feature $\rightarrow$ analysis

Low-level vision

- sharpening
- blurring
Low-Level

original image

Canny

data structure

Mid-Level

data structure

ORT

circular arcs and line segments

Low- to High-Level

low-level

edge image

mid-level

consistent
line clusters

Building Recognition