Welcome to CS 477/577

Introduction to Computer Vision

Admistrivia

Course page is now up: http://www.cs.arizona.edu/classes/cs477/fall11
(Linked from instructor's home page http://kobus.ca)

Lectures and assignments will require either connecting from a UA machine, OR a login id ("me") and password ("vision4fun").

Significant communication for the course will happen using the class mail list which will be live soon (cs477-11@listserv.arizona.edu).

Admistrivia

Group office hour:
Monday 11-12 GS 919 (proposed)

Other office hours available by **email**.
Tuesday 12:30-1
Friday 9:00-9:30
Friday 9:30-10:00

Important: Request for Office hours **MUST occur by 6pm the day before**.

Assignments

This course requires a CS account. Apparently (new for 2010), if you have a UA email and are registered, an account is automatically created for you.

Eight machines in 9th floor lab (gr01-gr08) will be available with priority for this course.

Assignment one will be posted very soon and will be due Friday, Sept 02 (late).

Assignment deliverables will require code to work when Kobus runs it using specified commands.

Unless we decide differently, gr01 will be our "reference" machine.

Assignments

Assignment one must be done in Matlab (one of the goals of A1 is to expose those who are not familiar to Matlab to it.

For most assignments, you will be able to use the language of your choice because the instructor will grade it from a user perspective.

Library support for those wanting to use C/C++ will be provided. Otherwise, Matlab will be the best choice for most.

What is (computer) vision?

" …, vision is the process of discovering from images what is present in the world, and where it is.

… our brains must be capable of representing this information … "

Marr 82, page 3.

Visual Representation ⇨ Semantic Representation

⇨ A tiger lying in the grass

Is vision computational?

Why study Computer Vision?

- Images and movies are everywhere
- Fast-growing collection of useful applications
  - building representations of the 3D world from pictures
  - automated surveillance (who's doing what)
  - movie post-processing
  - automated analysis of scientific data
- Various deep and attractive scientific mysteries
  - how does object recognition work?
- Greater understanding of human vision

More Applications

Image and video retrieval and data mining

Robotics
- Defect spotting
- Driving aids, autonomous flight
- Surveillance, identification

Graphics, Virtual Reality, Printing

Computer Vision in Context

Part of Artificial Intelligence

Connected to
- cognitive psychology
- perceptual psychology
- robotics
- databases
- imaging science

Key methods
- math
- stats
- programming
- empirical science

Graphics versus Vision

Graphics

model of the world --> images

Vision

images --> model of the world

Vision Systems

Biological

eye + brain

Man made

camera + computer

Computer Vision History

(Nope, it does not work yet)

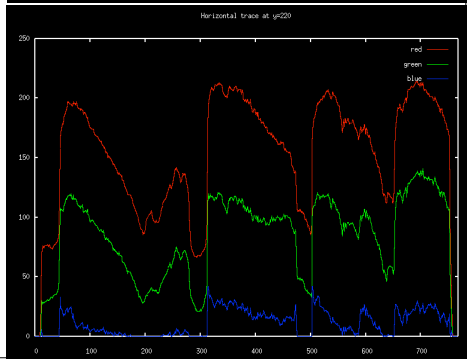
Properties of Vision

- One can "see the future"
  - You can avoid getting hit by an approaching object

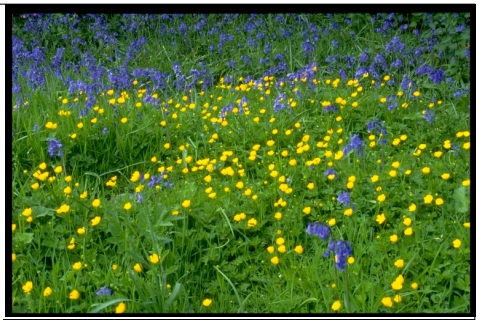
Properties of Vision

- 3D representations are easily constructed
  - Useful
    - to humans (avoid bumping into things; planning a grasp; etc.)
    - for applications (build models for movies).
  - Many different cues including
    - multiple views (motion, stereopsis)
    - texture
    - shading

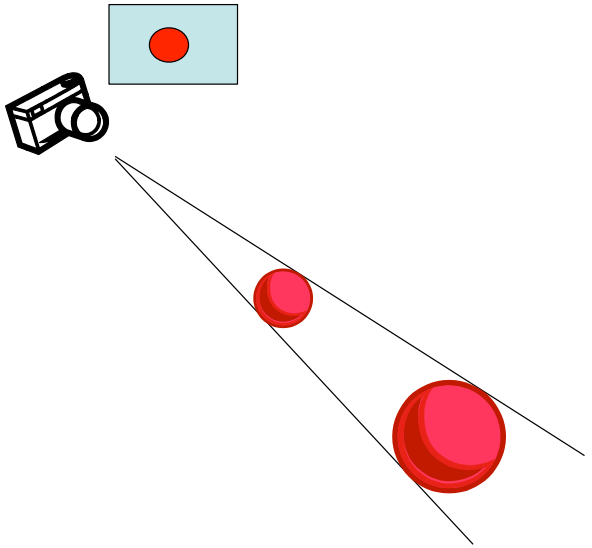
Shading Cues

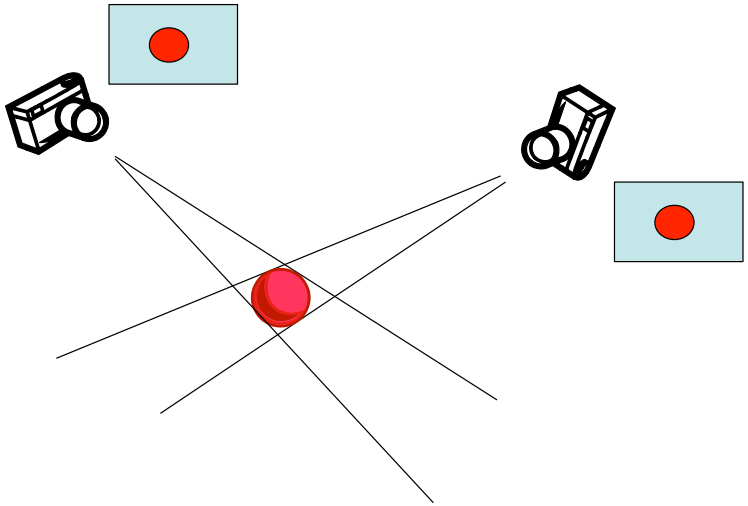


Shape from texture



Stereopsis





Properties of Vision (cont)

- People draw distinctions between what is seen
  - "Object recognition"
    - This could mean "is this a fish or a bicycle?"
    - It could mean "is this George Washington?"
    - It could mean "is this poisonous or not?"
    - It could mean "is this slippery or not?"
    - It could mean "will this support my weight?"
- Great mystery
  - How does it all work?
- Great challenge
  - Build programs that can infer useful information about the world from image data.