COS 429: Computer Vision

- Instructor
  - Fei-Fei Li
  - feifeili@cs.princeton.edu
  - Office: 211 CS Building
  - Office phone: 8-8130
  - Office hour: Thurs 4:30-5:30pm
- TA
  - Min Sun
  - msun@cs.princeton.edu
  - Office: 215 CS Building
  - Office phone: 8-1749
  - Office hour: Mon 10am-noon
- Class Time & Location
  - Tues & Thur 3:00-4:30pm
  - Room: 402 CS Building
- Website
- Signup on the mailing list: https://lists.cs.princeton.edu/mailman/listinfo/cos429

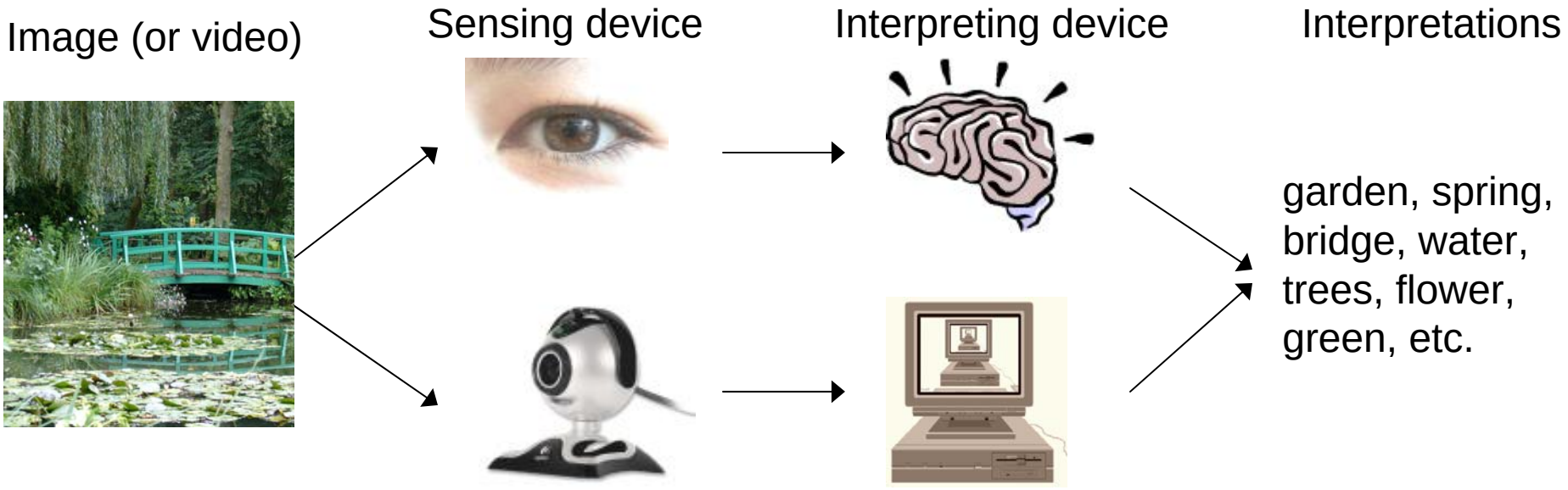
Today’s agenda

- What is computer vision?
- Administrative
  - Syllabus
  - Project
  - Grading policy

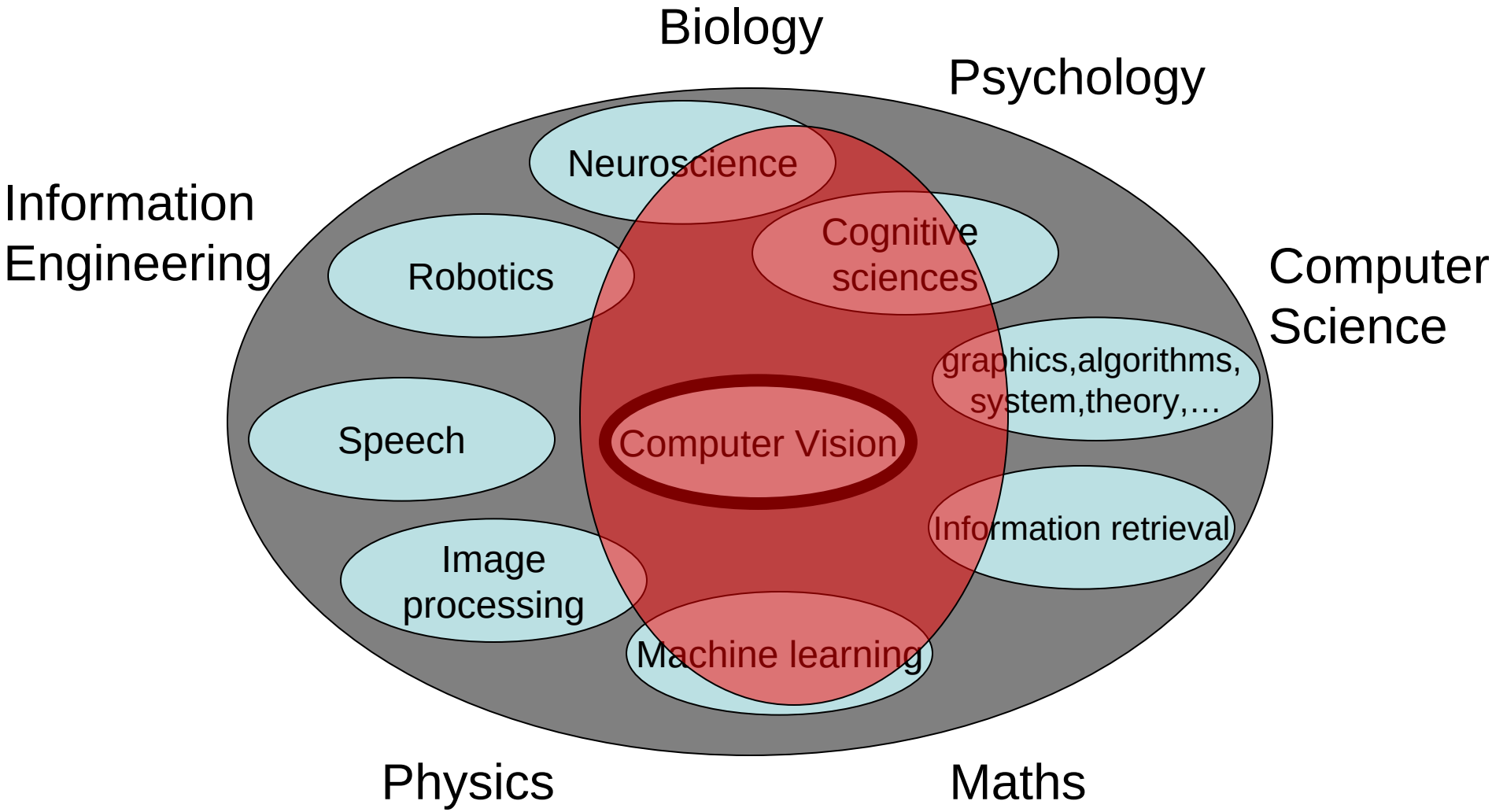
Quiz?

What about this?

What is (computer) vision?



What is it related to?



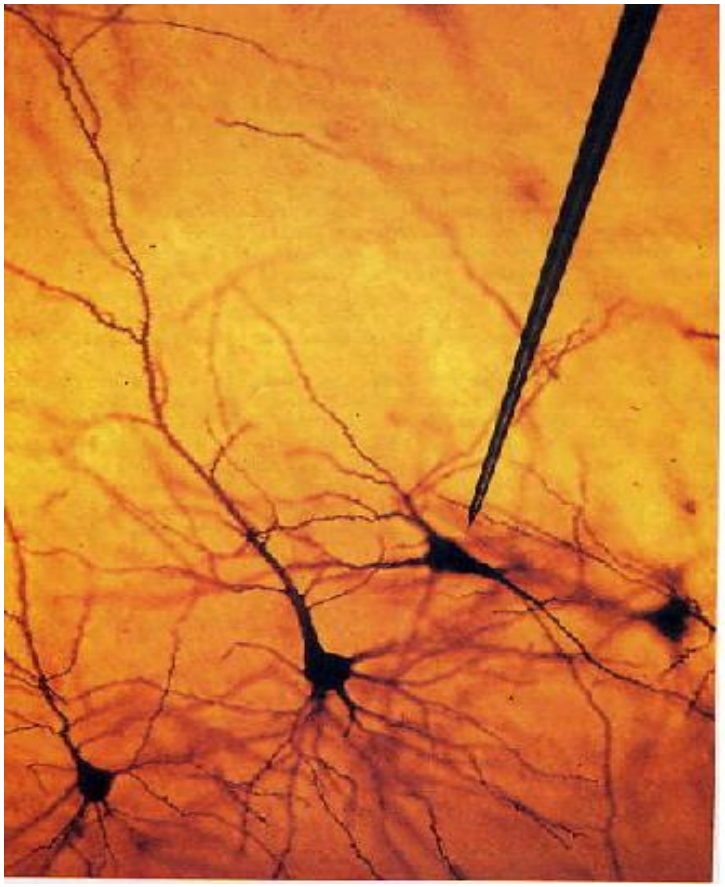
Every picture tells a story

- Goal of computer vision is to write computer programs that can interpret images

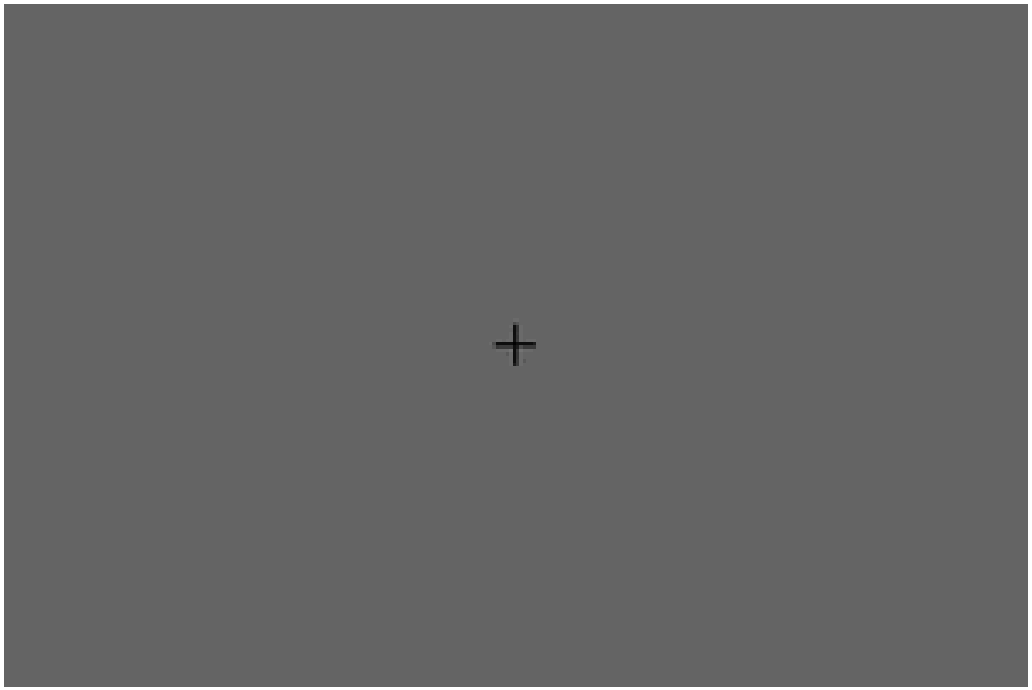
Can computers match human perception?

- Not yet
  - computer vision is still no match for human perception
  - but catching up, particularly in certain areas

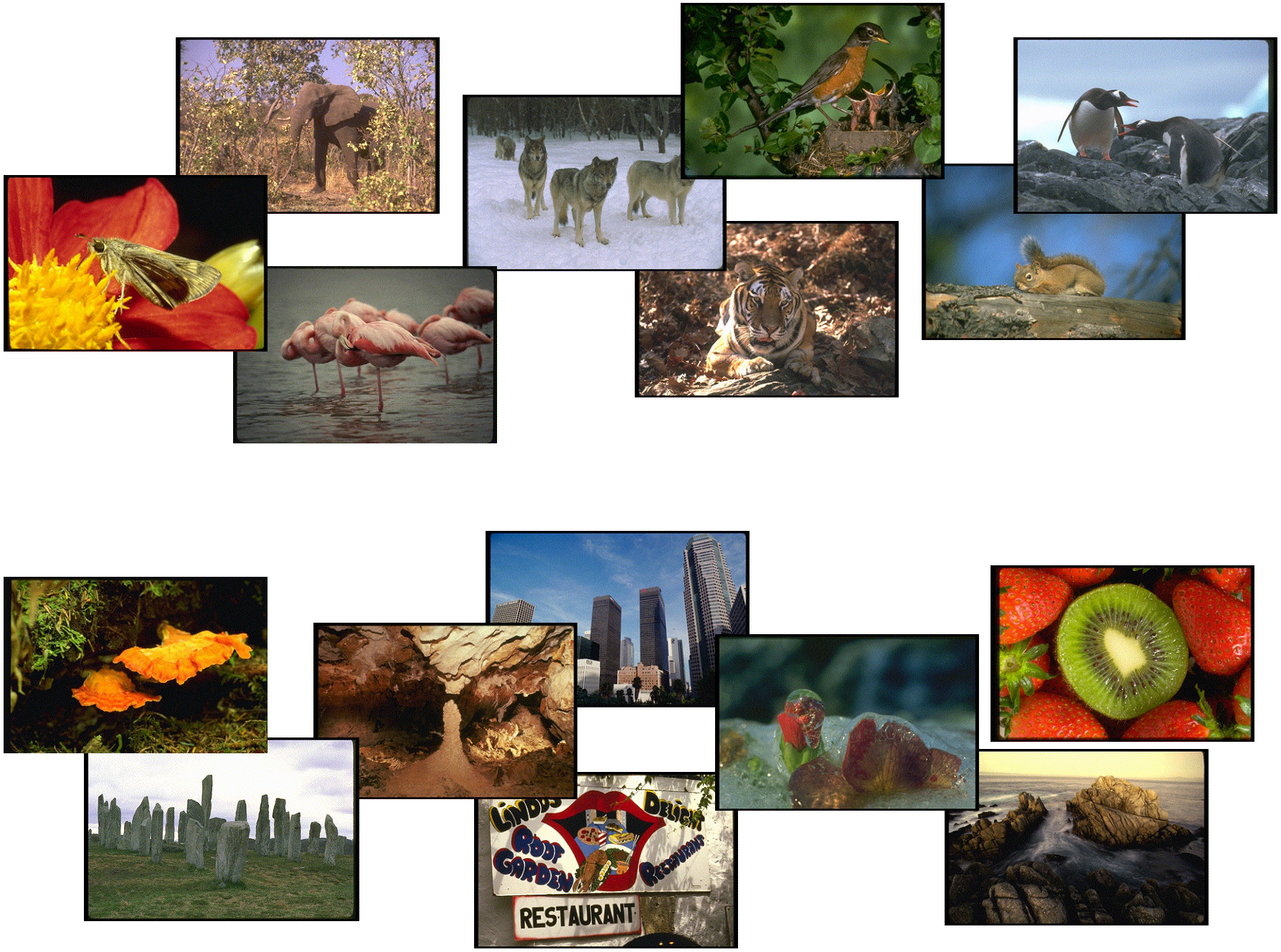
1981: Nobel Prize in medicine



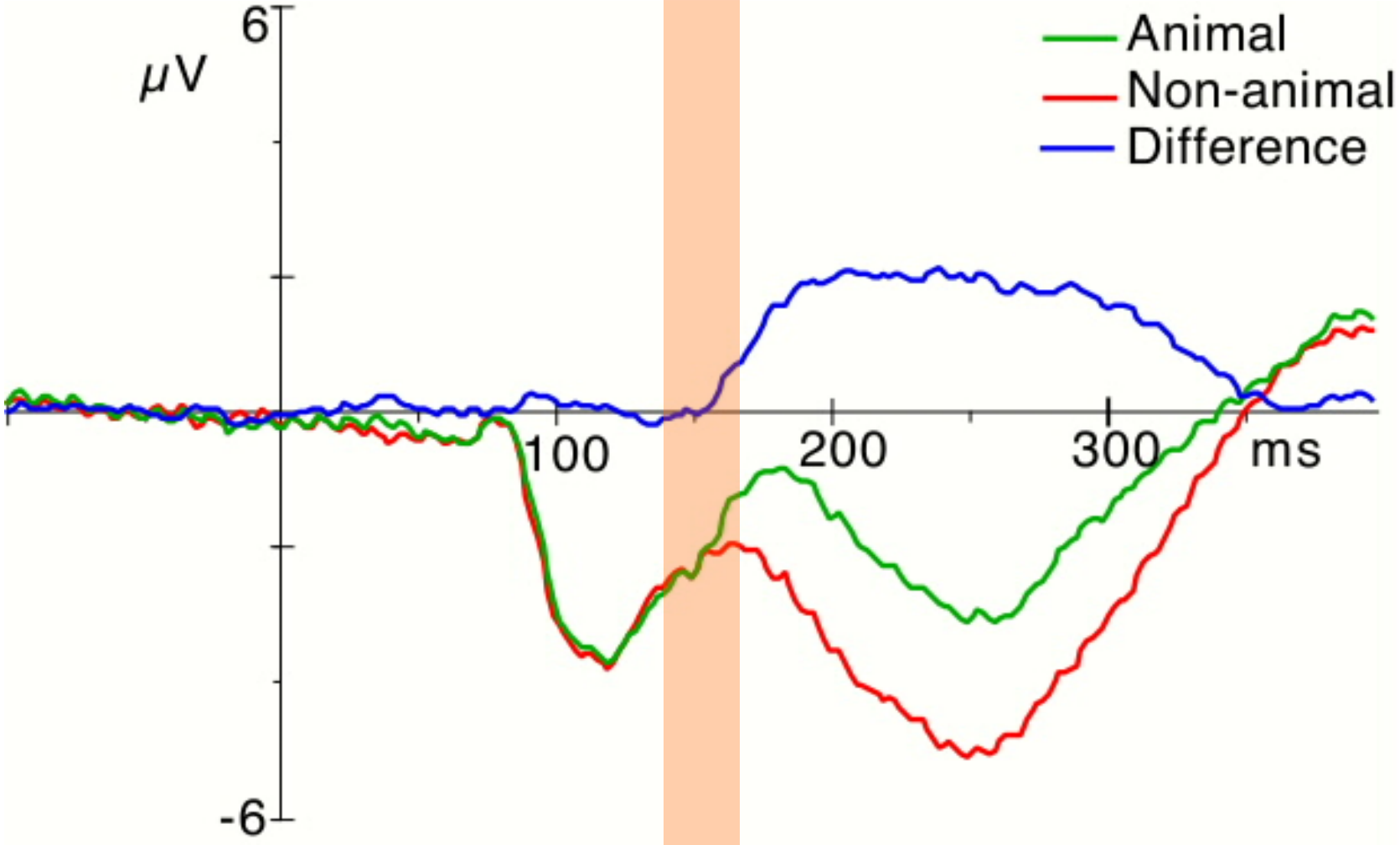
Hubel & Wiesel



Potter, Biederman, etc. 1970s



Thorpe, et al. *Nature,* 1996



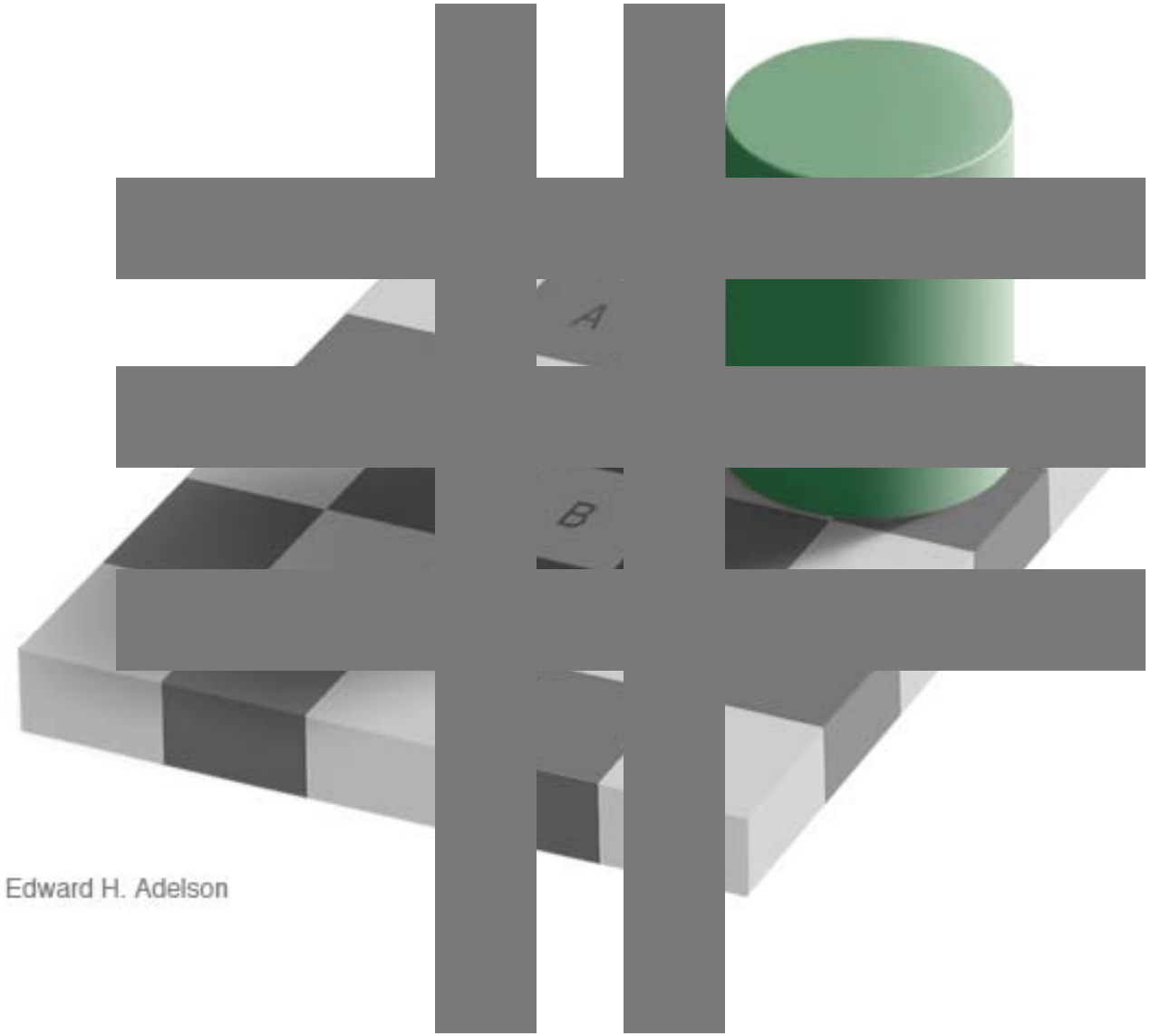
150 ms !!

Thorpe, et al. *Nature,* 1996

Rensink, O’regan, Simon, etc.

Rensink, O’regan, Simon, etc.

Perception



Edward H. Adelson

Low level processing

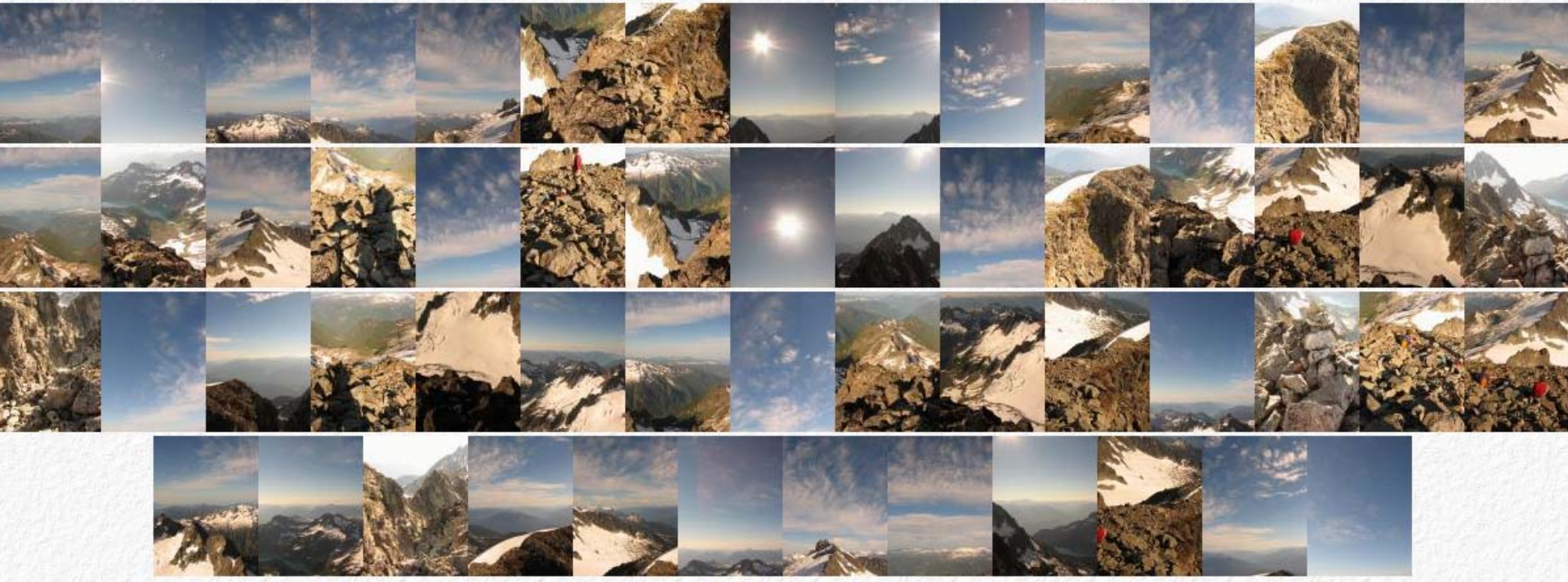
- Low level operations
  - Image enhancement, feature detection, region segmentation

Image enhancement

Image Inpainting, M. Bertalmío et al.
http://www.iua.upf.es/~mbertalmio//restoration.html

Image Inpainting, M. Bertalmío et al.
http://www.iua.upf.es/~mbertalmio//restoration.html

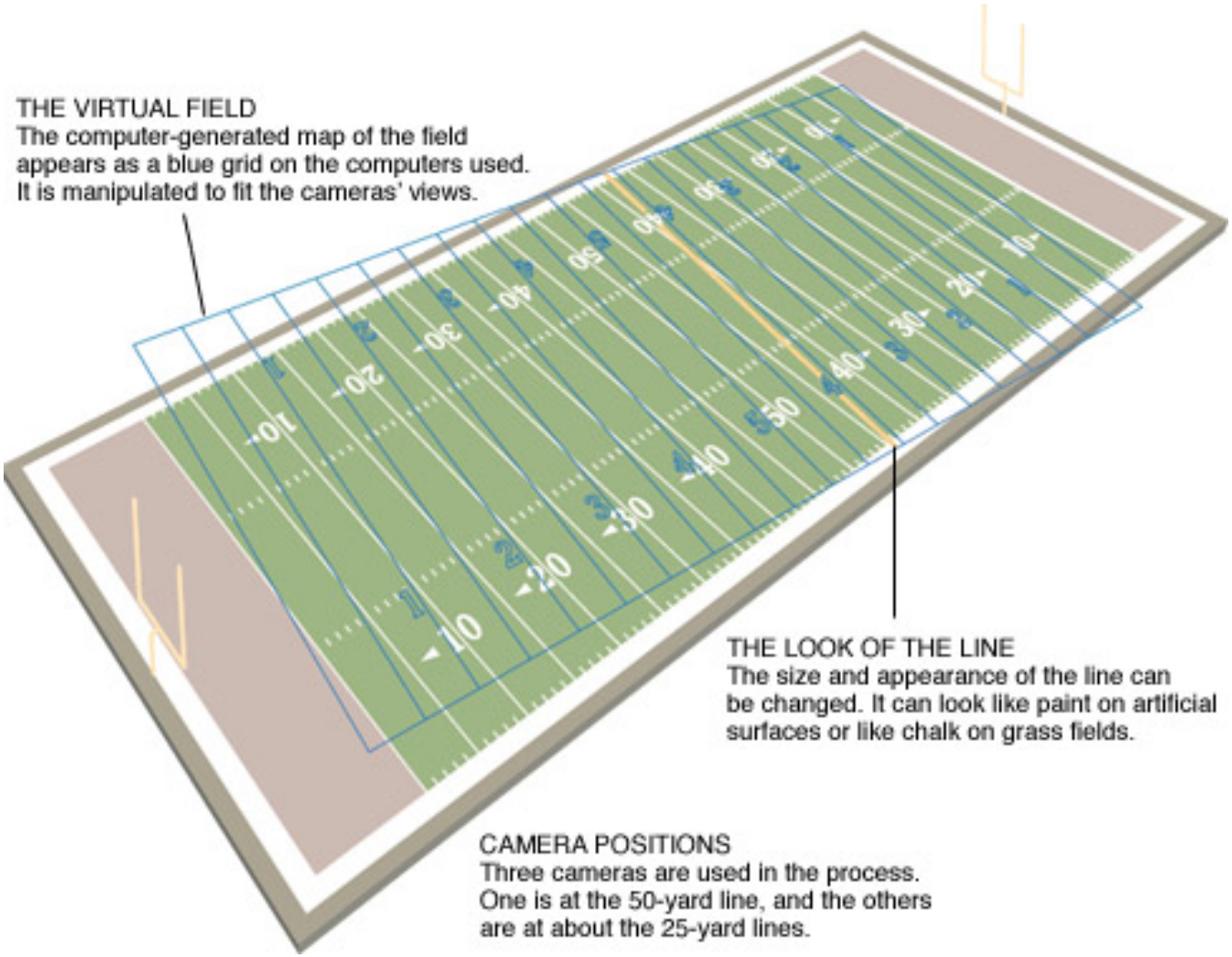
Automatic Panorama Stitching



Automatic Panorama Stitching

Image manipulation

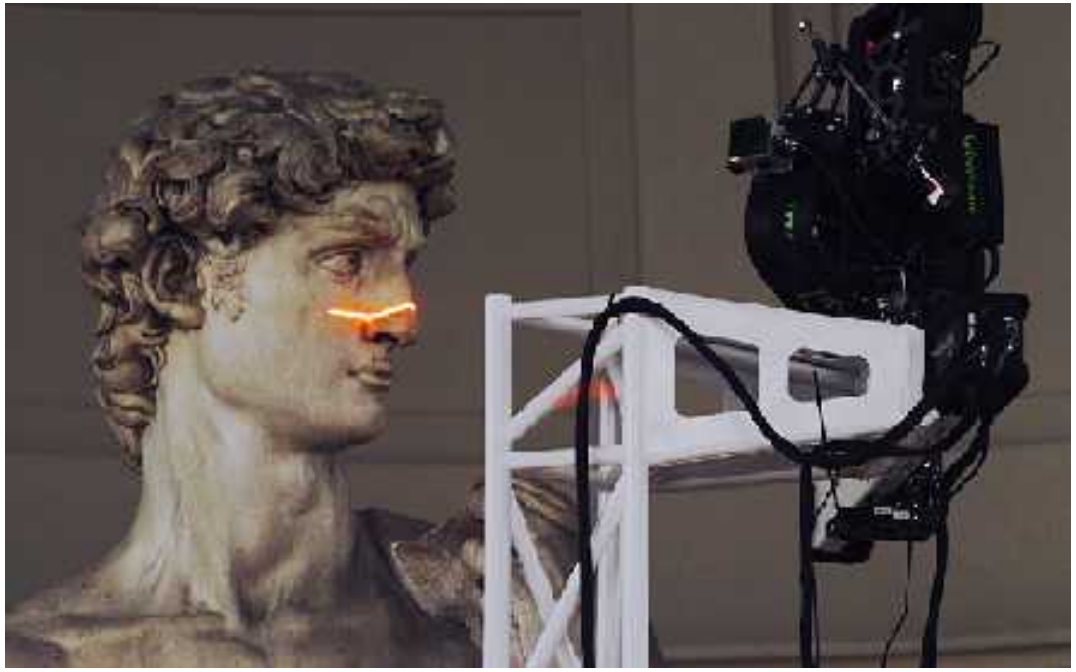
The ‘yellow line’ in superbowls



Mid level processing

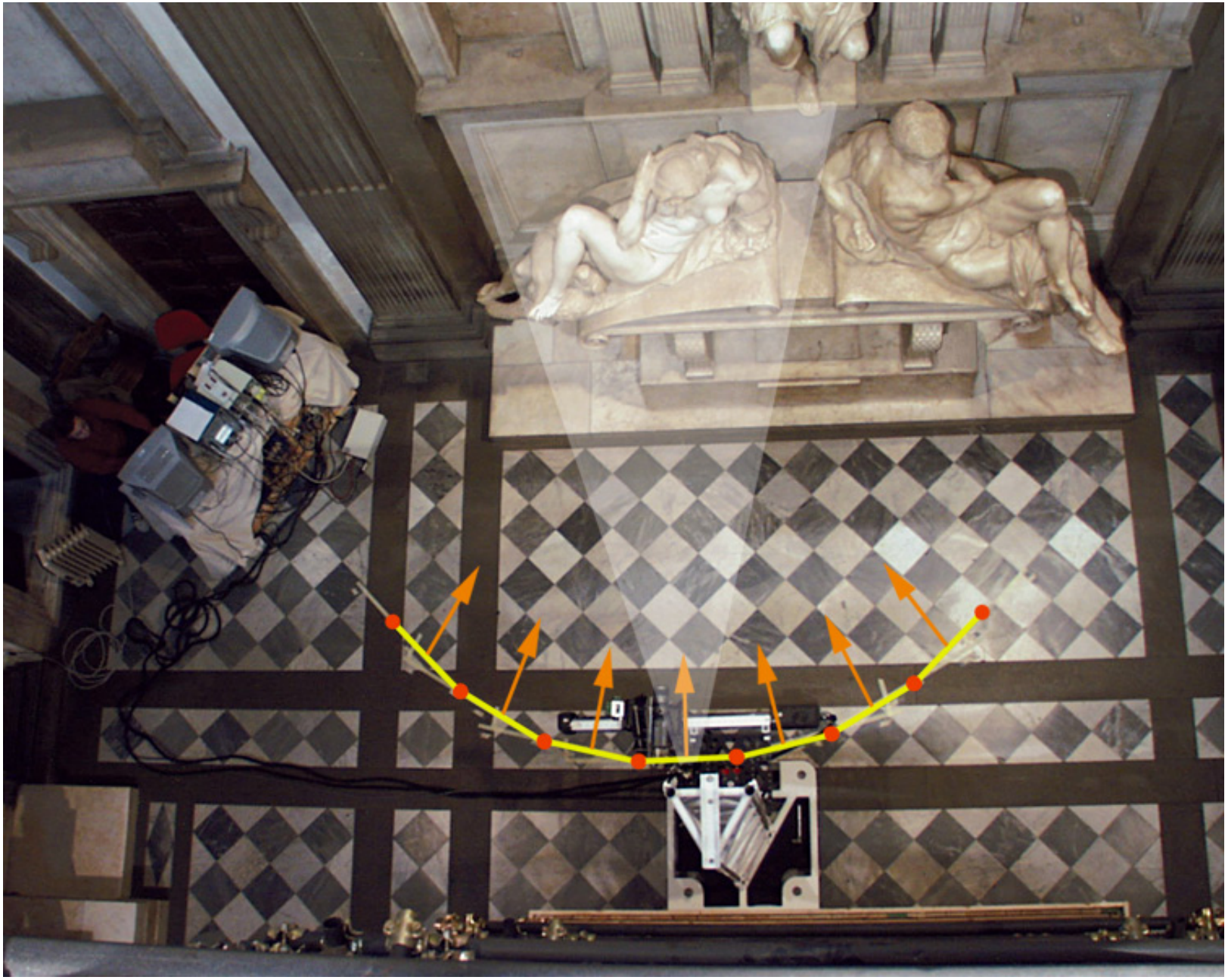
- Mid level operations
  - 3D shape reconstruction, motion estimation

3D Scanning

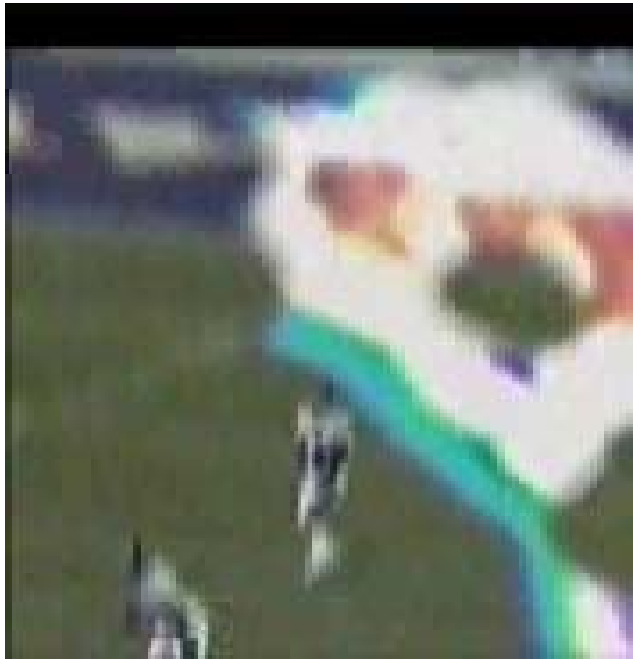


Scanning Michelangelo's *"The David"*

- The Digital Michelangelo Project
  - http://graphics.stanford.edu/projects/mich/
- 2 BILLION polygons, accuracy to .29mm



Ap re,



High level processing

- High level operations
  - Recognition of people, places, events

Last Updated: Monday, 6 February 2006, 14:29 GMT

E-mail this to a friend Printable version

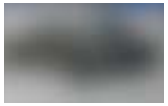
Face-hunting cameras boost Nikon

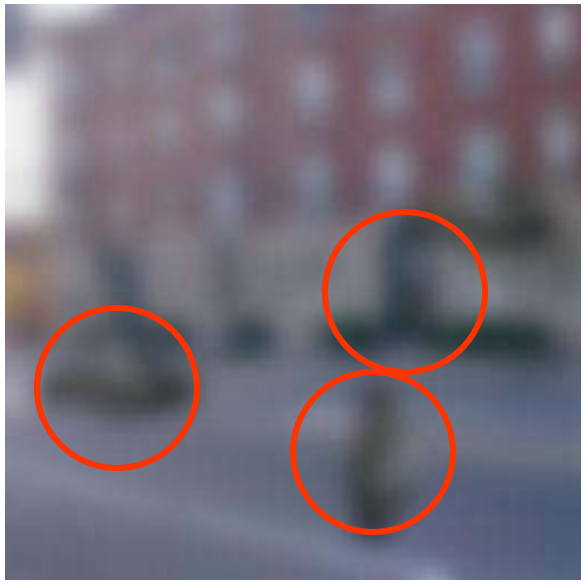
Japanese camera maker Nikon has tripled its profits on the back of strong sales of digital cameras that automatically focus on human faces.

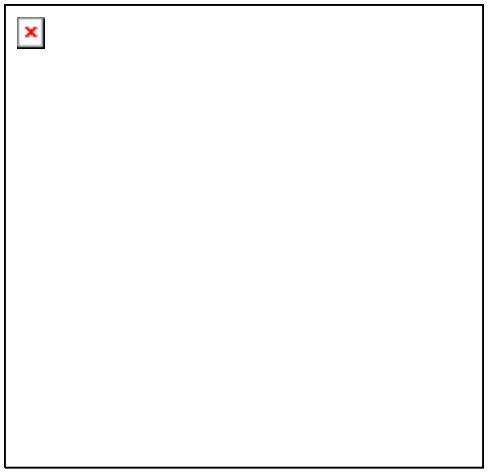
Face recognition cameras like the Coolpix L1 are popular

Sample image: Subject as seen on the COOLPIX 5900 camera's color LCD and when using Nikon's Face-priority AF function.


~10,000 to 30,000

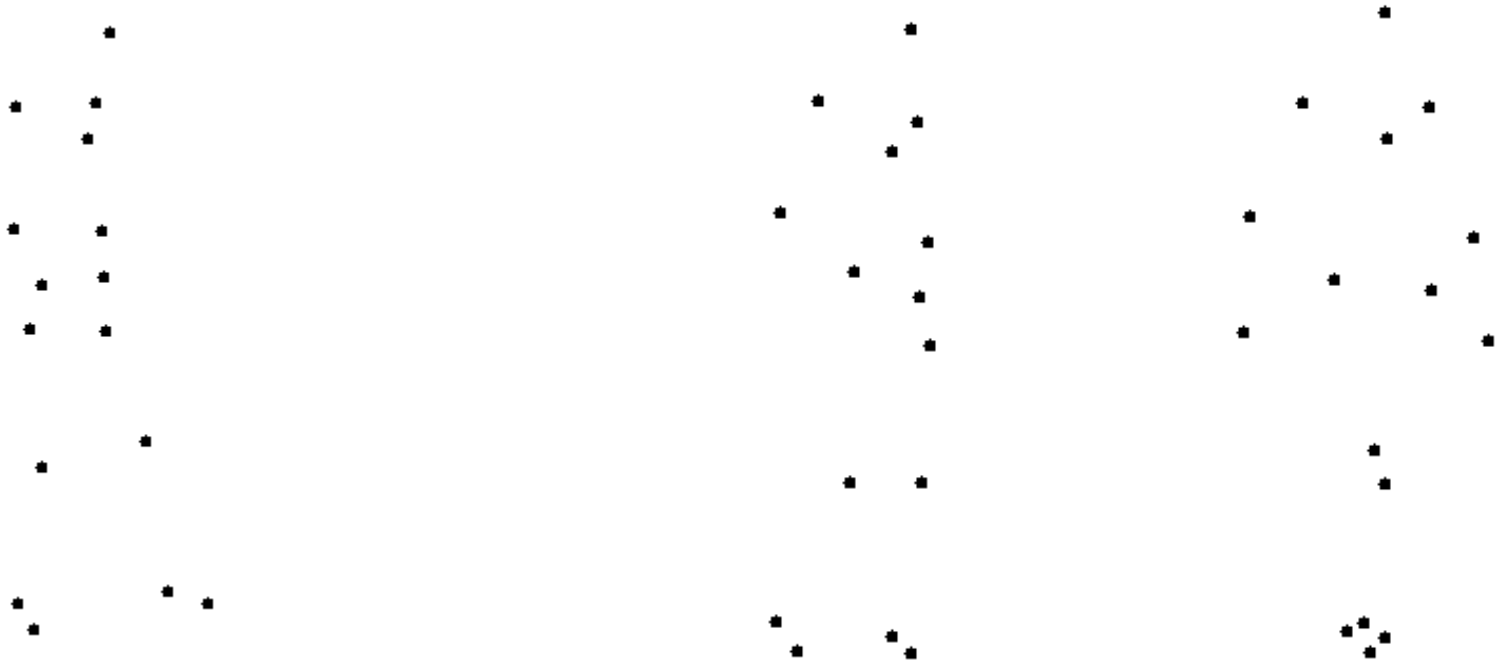




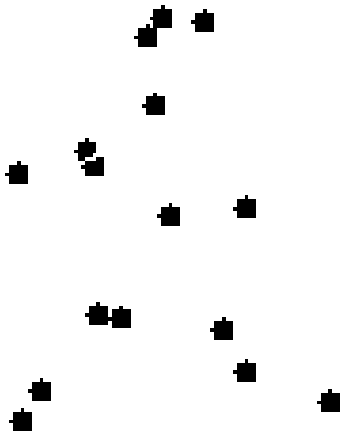


Human motion detection

Johansson’s experiments [‘70s]



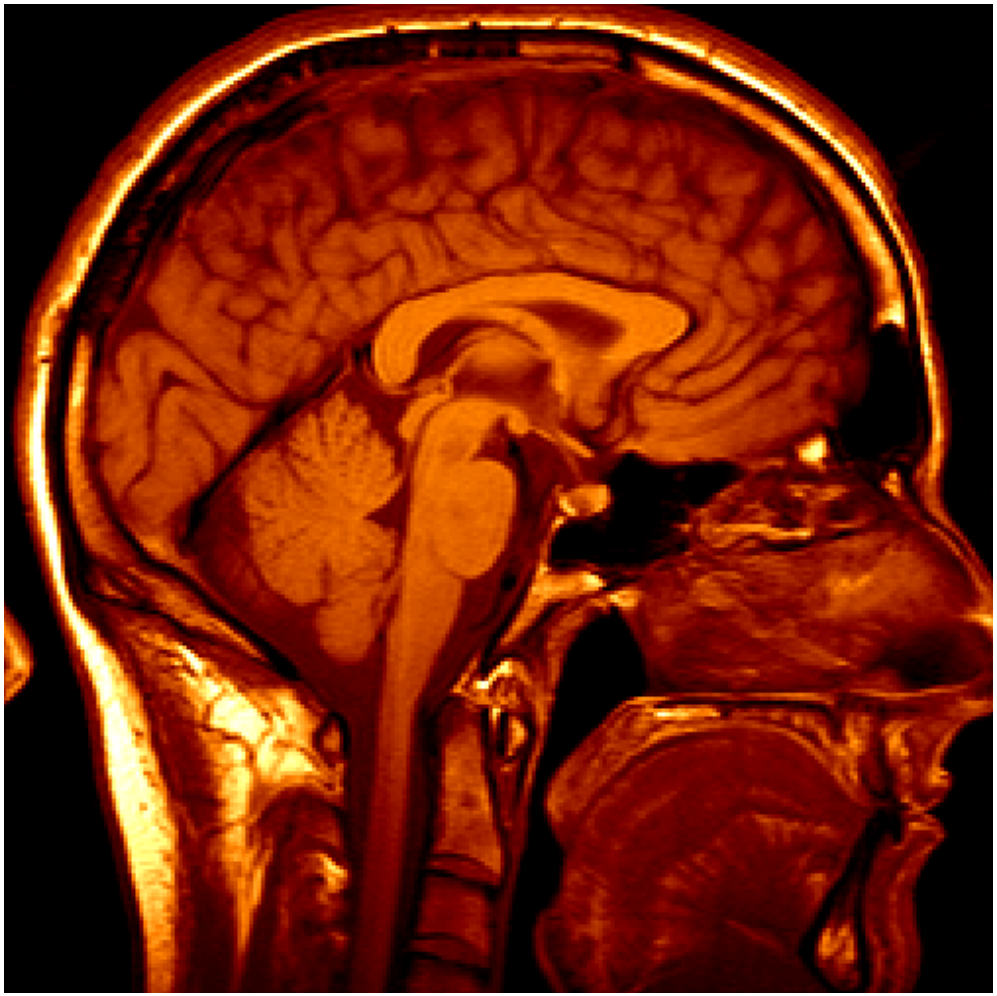
Can you tell what it is yet?



Learn to categorize motion

applications

Medical Imaging

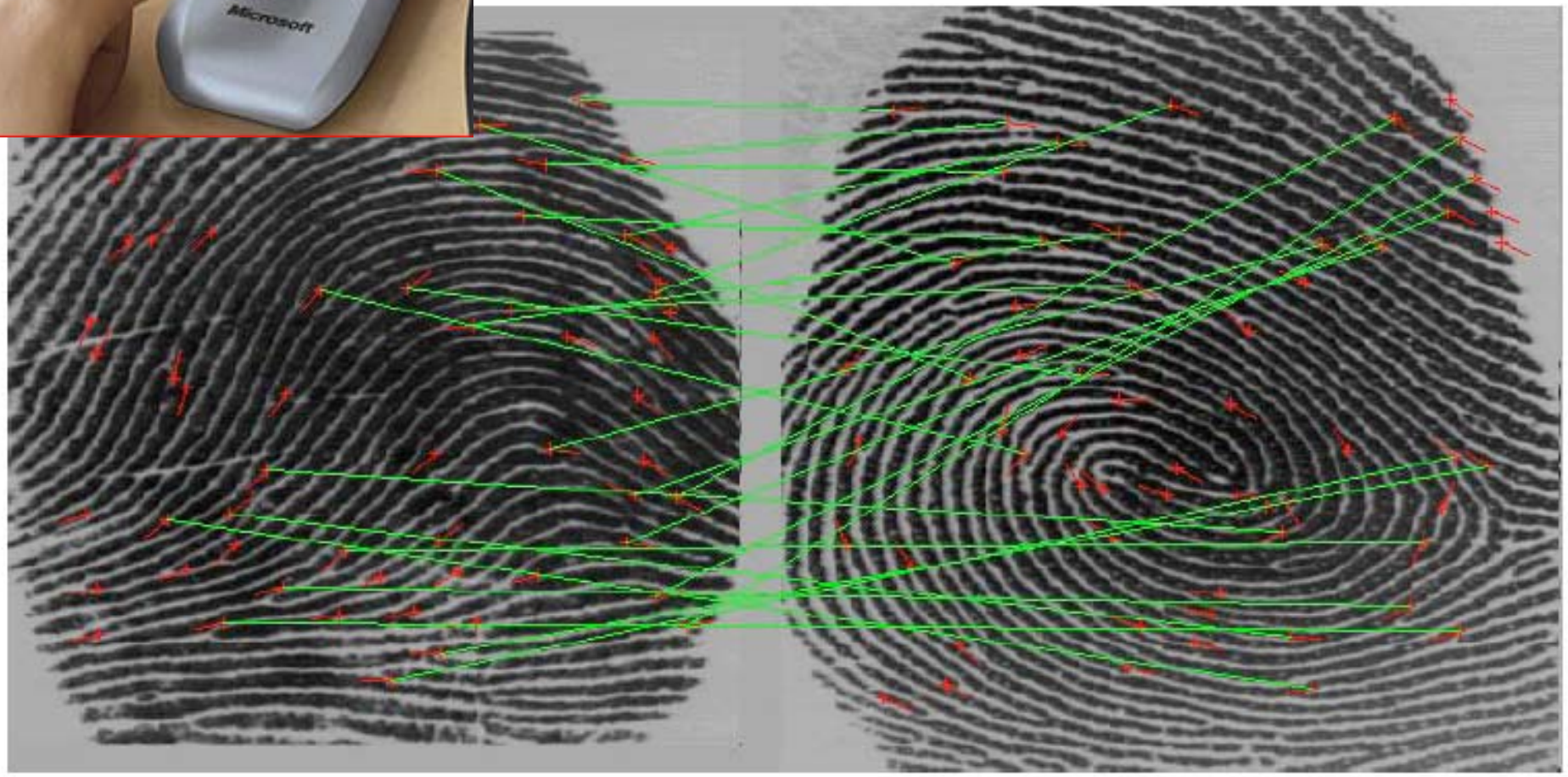


Robotics

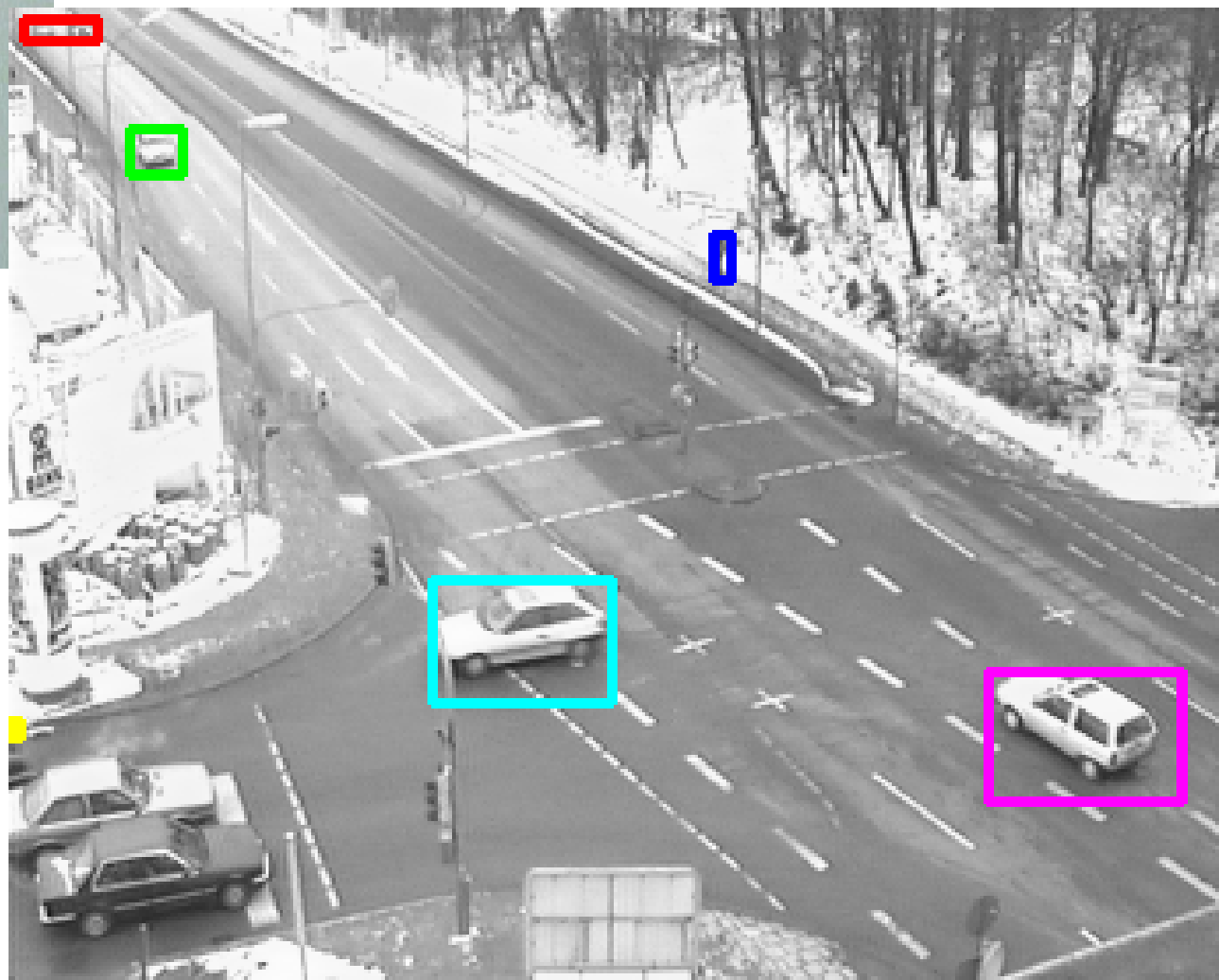
Toys and robots

Searching the web

Finger prints

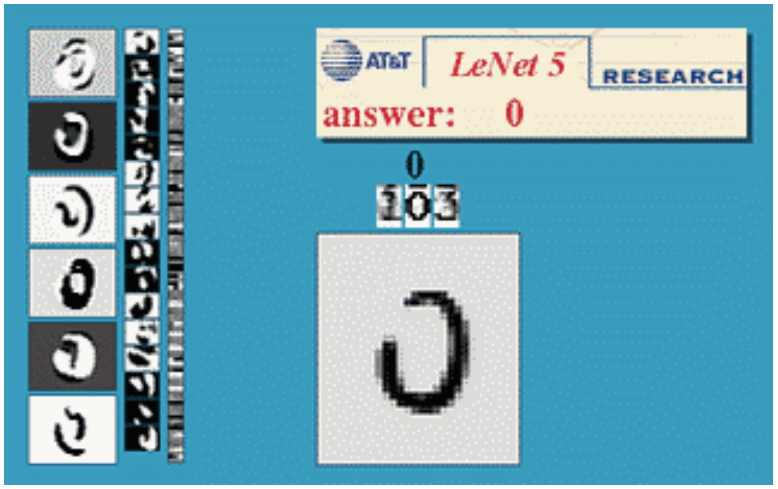


Surveillance



Security

Document Analysis



Digit recognition, AT&T labs
http://www.research.att.com/~yann/

Syllabus

- Go to file…

Grading policy

- Attendance and class participation: 10%
- Homework: 40%
  - We have 6 homework
  - Late policy
    - 3 free late days – use them in your ways
    - 0 grades beyond that
  - Collaboration policy
    - Read the student code book, understand what is ‘collaboration’ and what is ‘academic infraction’
- Course project: 50%
  - your performance in the final competition
  - quality of your write-up
  - final codes and paper due on Tues, Jan 13th (Dean’s Day)

- A word about ‘the curve’

Course Project 1:
the Finding Mii Challenge

Course Project 2: overview

- 50% of your grade
- Form your team:
  - either 2 people or 1 person
  - but the quality is judged regardless of the number of people on the team
  - be nice to your partner: do you plan to drop the course?