Computer Vision (CSE 490CV, EE400B)

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Web Page
- http://www.cs.washington.edu/education/courses/cse490cv/02wi/

Handouts
- course info
- survey, due Friday
- readings
- account forms

Today

Overview of Computer Vision
Overview of Course
Image Filtering

Readings for this week
- Forsyth & Ponce, chapters 8.1-8.2
  - http://www.cs.washington.edu/education/courses/490cv/02wi/readings/book-7-revised-a-indx.pdf
- Watt, 10.3-10.4 (handout)
- Cipolla and Gee (handout)
  - supplemental: Forsyth, chapter 9
- Intelligent Scissors
  - http://www.cs.washington.edu/education/courses/490cv/02wi/readings/book-7-revised-a-indx.pdf

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What is Computer Vision?

La Gare Montparnasse, 1895

Computer programs that interpret images

Image Processing

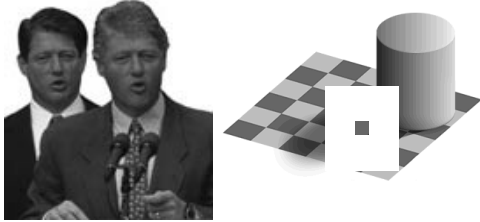Original   Retinex

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Perception

Perception
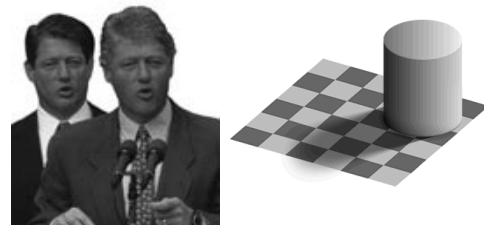
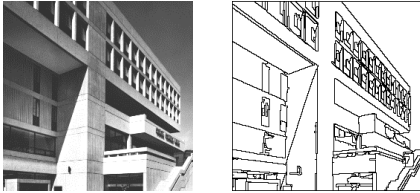## Perception
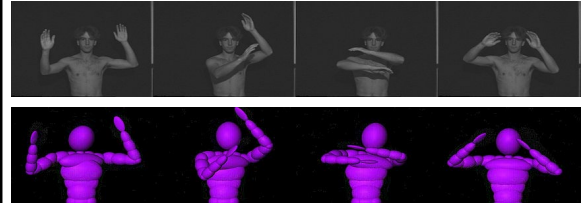

Computer Graphics

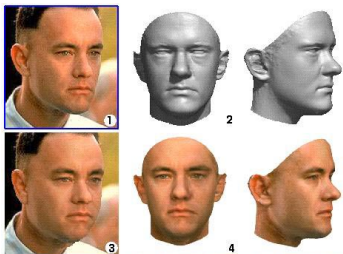## Topics in this class: Low-level vision

- image filtering
- edge detection
- feature detection
- image pyramids

Topics in this class: Motion Estimation

- optical flow
- feature tracking
- image alignment
- image mosaics

Topics: 3D Scene Reconstruction

- projective geometry
- camera modeling
- single view metrology
- camera calibration
- stereo
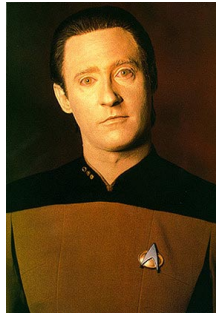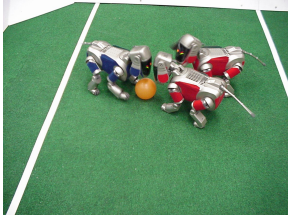- structure from motion

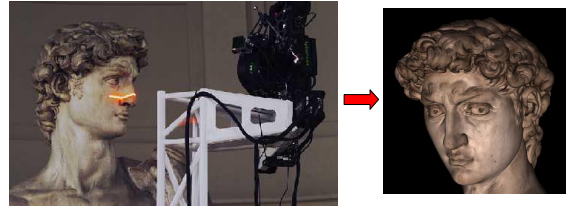Debevec video

Topics: Object Recognition

Face group, CMU
http://www.ri.cmu.edu/labs/lab_51.html

Applications: Robotics

Applications: 3D Scanning

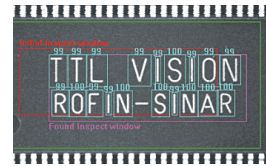Scanning Michelangelo's *"The David"*
- The Digital Michelangelo Project
  - http://graphics.stanford.edu/projects/mich/
- UW Prof. Brian Curless, collaborator
- 2 BILLION polygons, accuracy to .29mm

Applications: Motion Capture

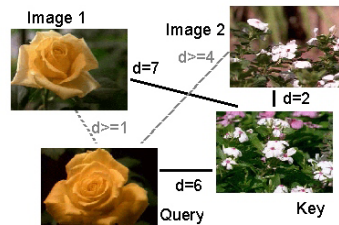## Applications: Industrial Inspection
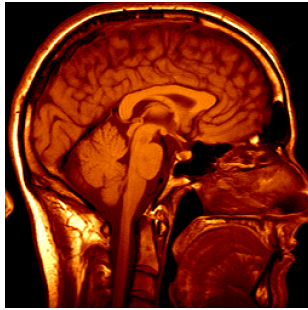

Applications: Games

Crowd games
- work at CMU and UW

Application: Image Retrieval
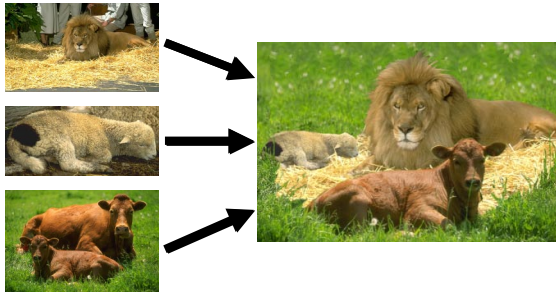
Application: Medical Imaging

Application: Document Analysis

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

Project 1: Intelligent Scissors

Project 2: Panorama Stitching

http://www.cs.washington.edu/education/courses/cse490cv/02wi/

Project 3: Single View Modeling

Project 0

There will be a short project assigned this Friday
Goal is to get familiar with image IO, UI infrastructure

Class Webpage

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Grading

Programming Projects
- filtering (10%)
- image scissors (20%)
- panoramas (20%)
- single view modeling (20%)

Midterm (15%)

Final (15%)

General Comments

Prerequisites—*these are essential*!
- Data structures (CSE 326)
- A good working knowledge of C and C++ programming
- Linear algebra
- Vector calculus

Course does not assume prior imaging experience
- computer vision, image processing, graphics, etc.

Course will be programming-intensive!