CSE/EE 576
Computer Vision
Spring 2007

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Introduction

- What IS computer vision?

 the analysis of digital images by a computer

- Where do images come from?

Applications: Medical Imaging

CT image of a patient's abdomen

# Visible Man Slice Through Lung
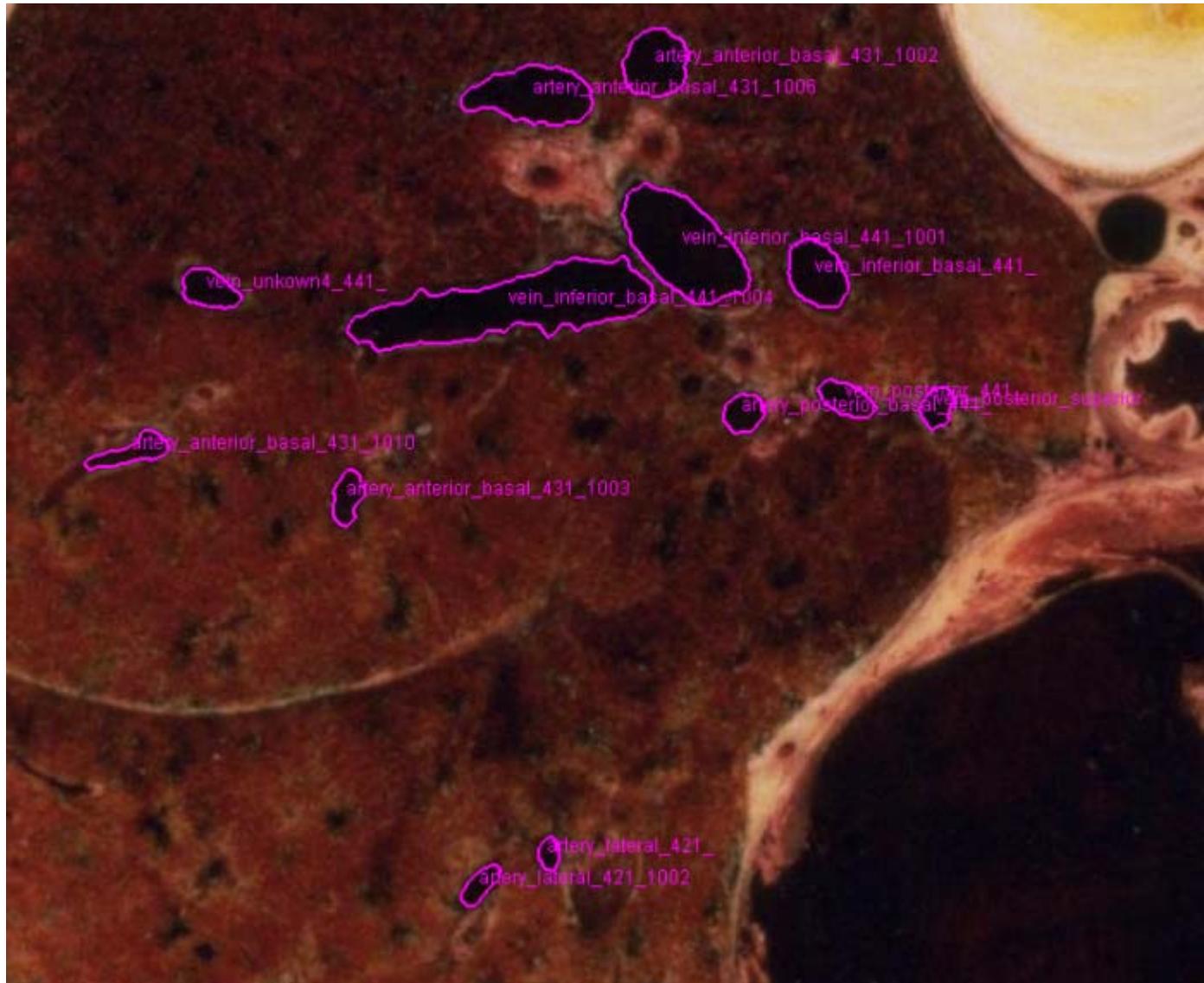
# 3D Reconstruction of the Blood Vessel Tree
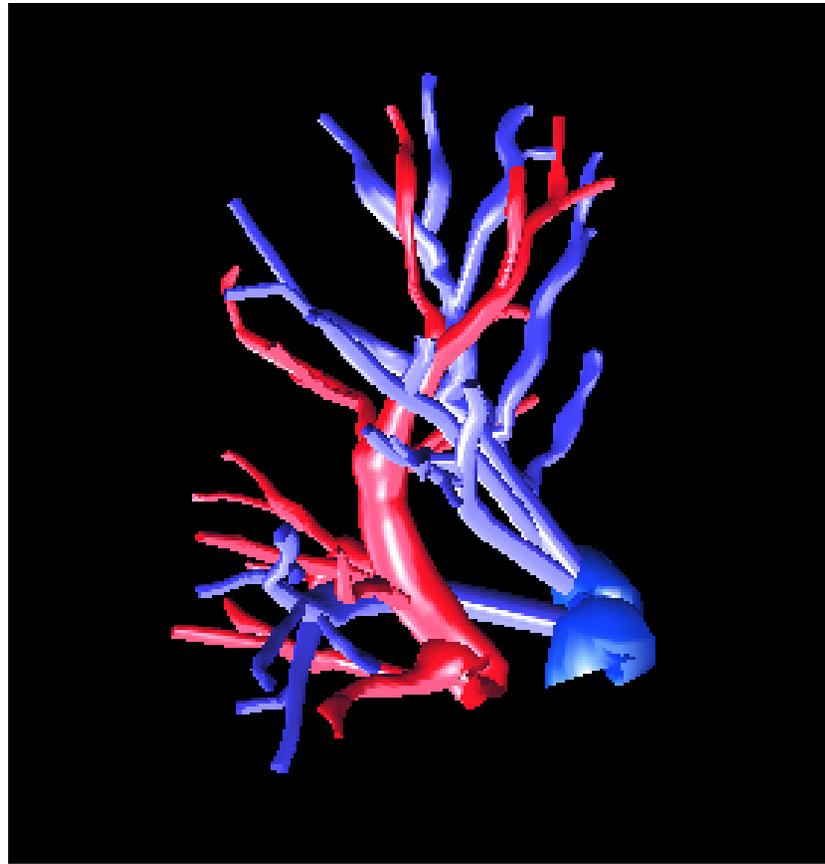
Slice of a Chicken Embryo's Inner Ear
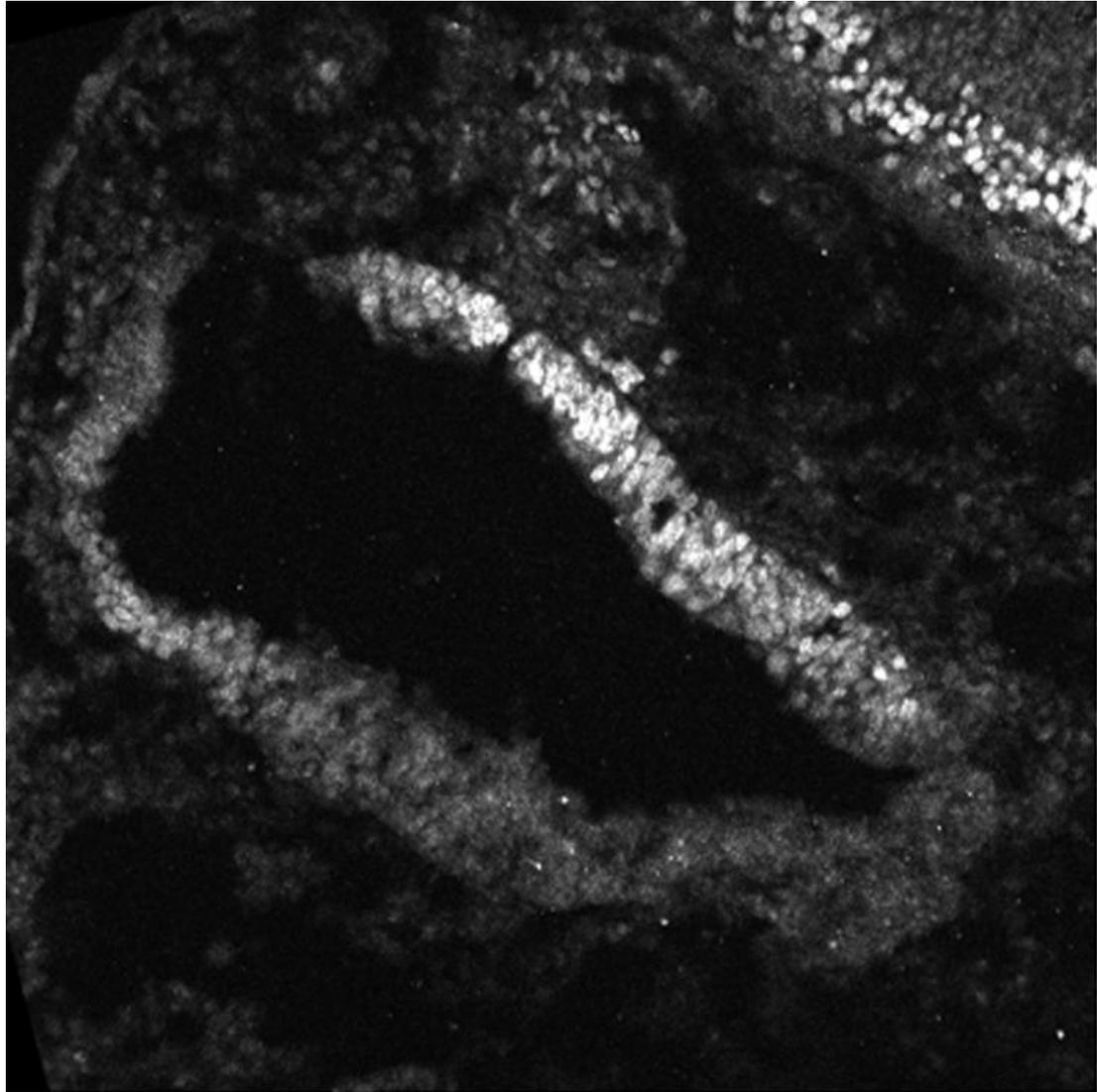
CBIR of Mouse Eye Images for Genetic Studies
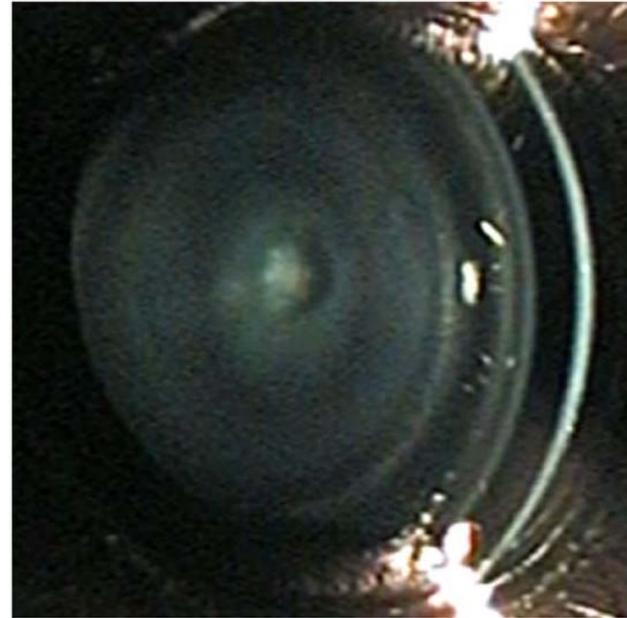
Robotics

- 2D Gray-tone or Color Images

"Mars" rover

- 3D Range Images

What am I?
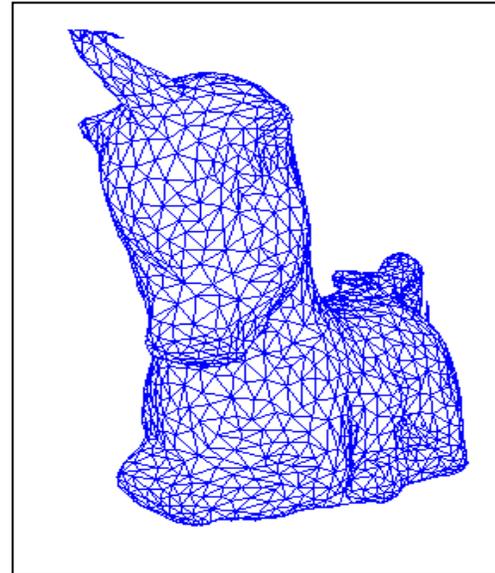
- Robot Soccer
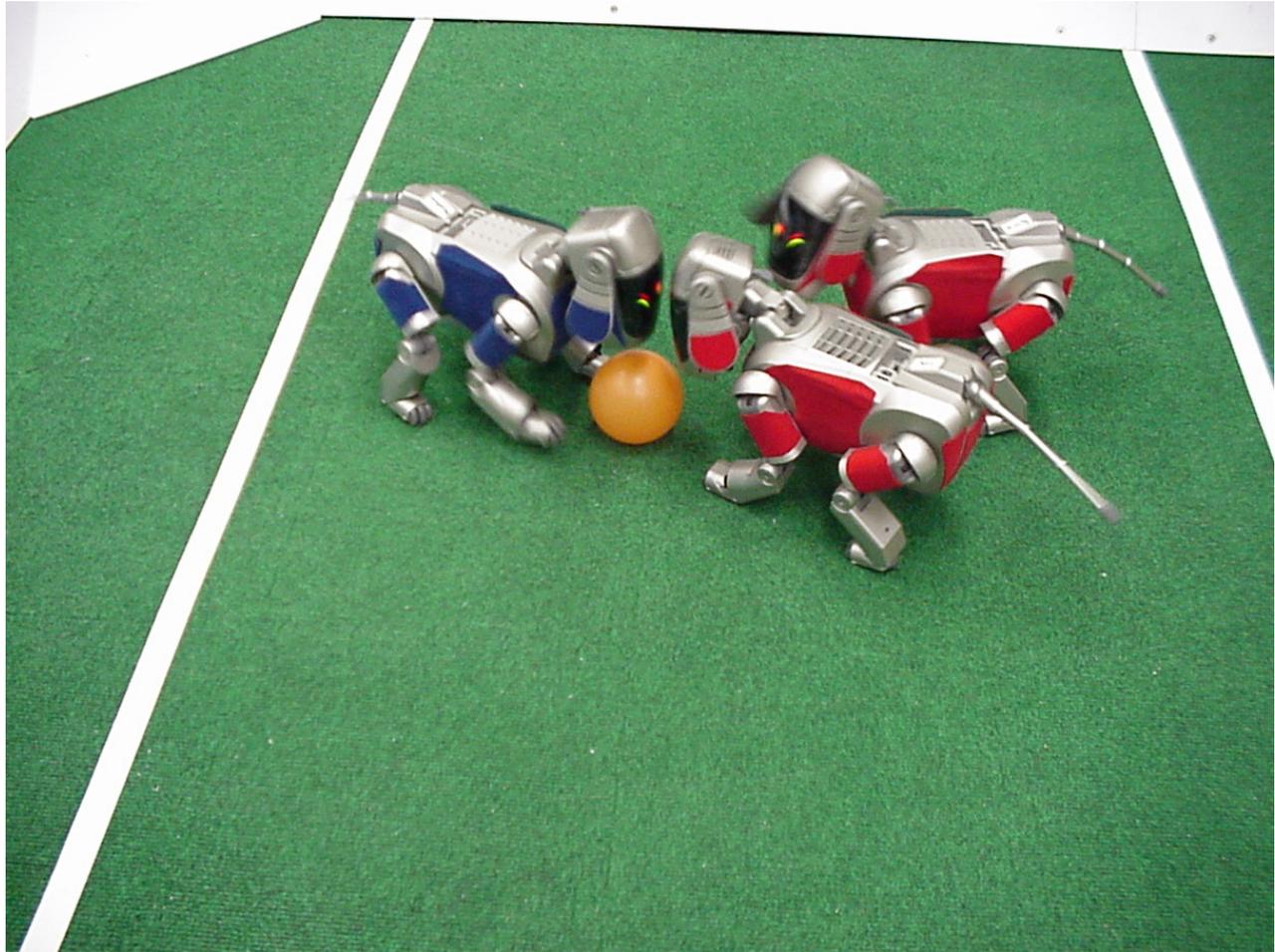
Image Databases:

Images from my Ground-Truth collection:
http://www.cs.washington.edu/research/imagedatabase/groundtruth

• retrieve images containing trees

Some Features for Image Retrieval

Original Images	Color Regions	Texture Regions	Line Clusters
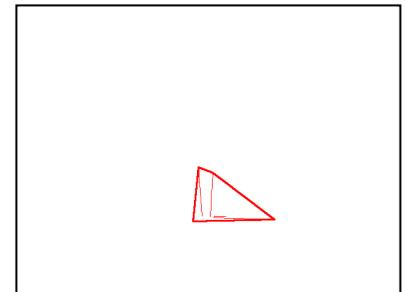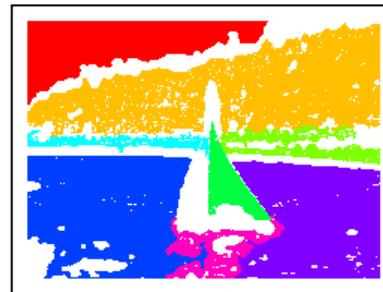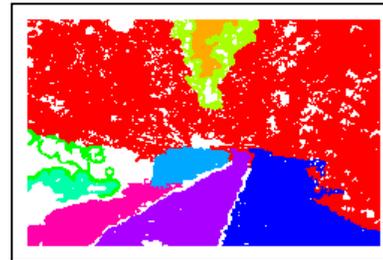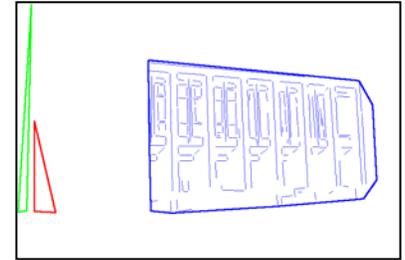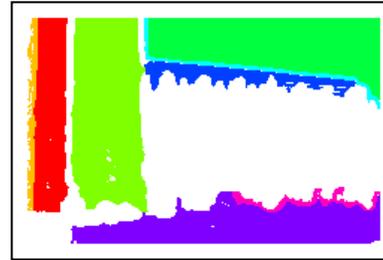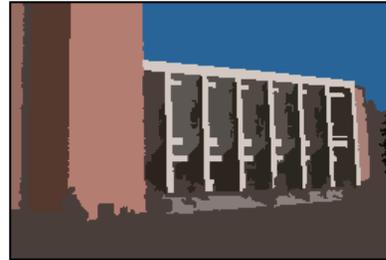
Documents:
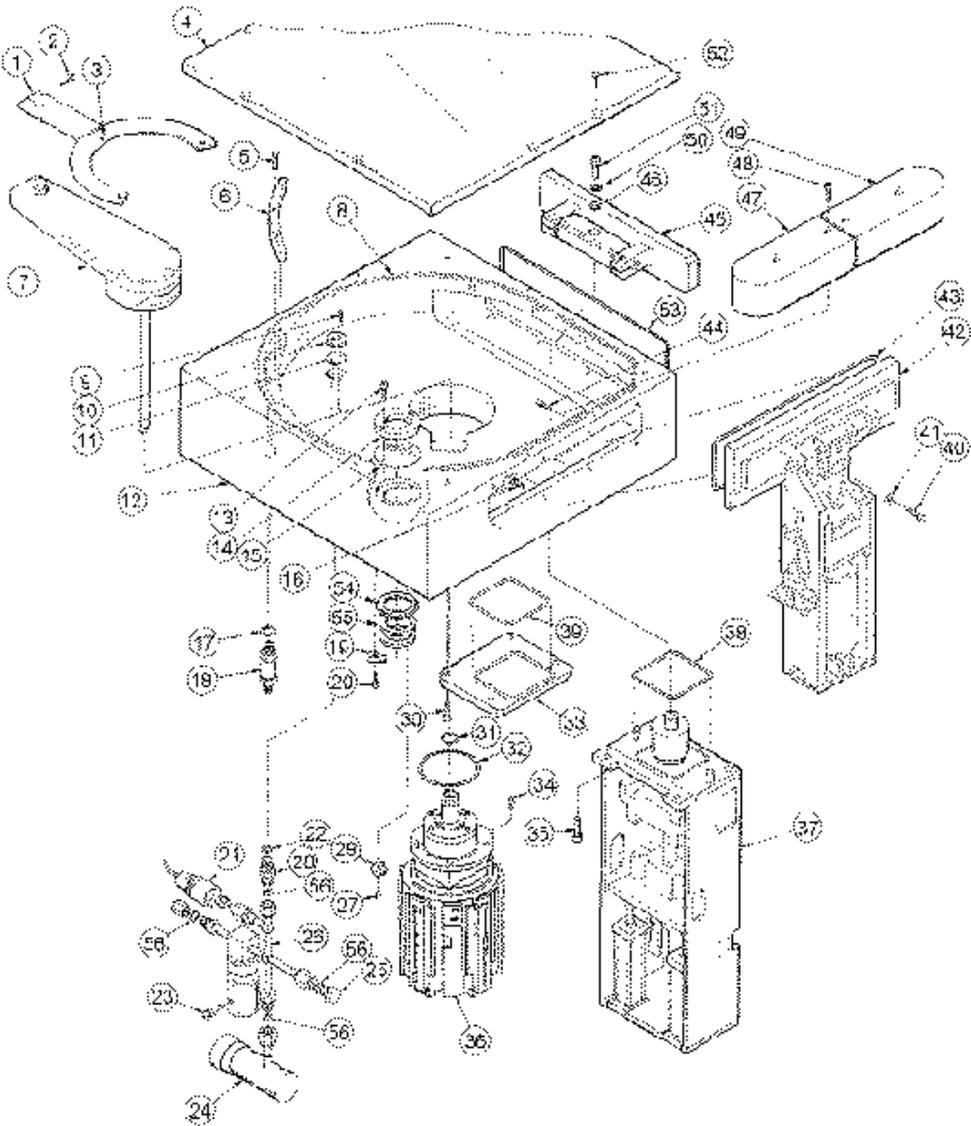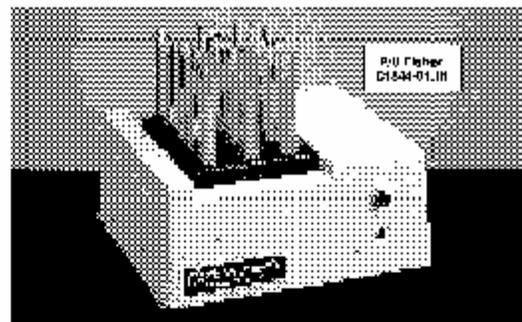
Model 145 Isotemp® Dry Bath Incubator

• Holds 1 to 4 heating blocks with choice of 11 well sizes
• Maintains every sample to within ±0.1° C of temperature

Unique sample wells are shaped so that aluminum blocks deliver same amount of heat to all parts of the sample tube. No temperature gradient—neither too hot at the bottom nor too cold at the top—that may invalidate tests in tubes with dilutions in individual wells. Sample tubes rest on individual plugs, to prevent localized heating. A low, even density heater is mounted on a thick aluminum heat distribution plate in the base of the bath. Plate is ¼" thick (5.5 mm). Dry bath minimizes cleanup problems because tubes stay dry.

Ambient to 125° C (26° 2°) each ±1° C. Control Dial temperature controls are used from 35° to 125° C. Ideal for enzyme reactions, inactivation of sera, Rh studies, close cross-matching and chemistry determinations. Dimensions: 8 L x 15 W x 4" H (28 x 13 cm). With line cord and plug. Heating blocks sold separately (see lower right).

Electrical Requirements

	Cat. No.	Each
120V 50/60 Hz, 300W (CSA approved)	11-715-100	869.84
240V 50/60 Hz, 800W	11-715-101	935.23

Consage the order item manual 3¾" D Programable Model

Incu-Block® Partial Immersion Thermometers

For all standard bacto blocks and water baths. Critical temperatures (25°, 30°, 37°, 56° C) are marked with arrows. Available with shatterproof, contamination proof Teflon® coating. Total length: 176 mm. Immersion 35 mm.

Range, °C	Div, °C	Teflon Coated	Cat. No.	Each
35-57.2	0.5°	No	14-992	45.84
35-57	0.5°	Yes	14-993	45.15

More Thermometers

For more thermometers, including digital types,

Model 147 Isotemp® Dry Bath

• Holds single heating block with choice of 11 well sizes

Similar to Model 145, uses a ¼" thick (5.5 mm) plate. Ideal for labs with smaller volumes of enzyme and earlier and assays, Rh studies, and dry incubations. Screwdriver-actuated temperature control between ambient and 95° C (204° F). Observe thermometer placed in one sample tube to set, adjust control through hole in front panel. Maintains set temperature to consistency and uniform to ±1.5° C.

Supplied with strong nylon case, thermostatically regulated heater, and indicator lamp, line cord and plug, and instructions. Dimensions: 8 L x 6½ W x 3" H (15 x 17 x 8 cm). CSA approved. Heating blocks sold separately (see below).

Electrical Requirements

	Cat. No.	Each
120V 50/60 Hz, 120W	11-715-102	223.58

Interchangeable Heating Blocks for Isotemp® Dry Baths

For Models 145 and 147 Dry Baths. Composed of block anodized aluminum alloy. Chemical resistant. Dimensions: 4 L x 3 W x 2" H (10 x 7.6 x 5 cm).

The 11-715-123 block provides a safe, dry bath alternative for warming Lee Spatre of tissue forceps. Avoids hazardous use of burners around flammable histologic solvents.

The 11-715-120 block is specifically designed to hold twenty 9.5 mm Roche Diagnostics Placentex® pregnancy test tubes. This special shallow well block is similar to the other block with 10 mm holes, but sample wells are only ¾" deep (1.9 cm) to meet test requirements. Wells in all other blocks are 1¾" deep (4.4 cm).

Tube Size, mm	Wells/Block	Cat. No.	Each
6	35	11-715-105	71.18
10	20	11-715-107	71.18
9.5	20 (shallow)	11-715-120	71.18
12	12	11-715-109	71.18
12.5	12	11-715-121	71.18
13	12	11-715-111	71.18
13	12	11-715-113	71.18
16	8	11-715-123	71.18
18	12	11-715-115	71.18
20	6	11-715-117	71.18
25	5	11-715-119	71.18

Forceps Heating Block
For warming Lee Spatre forceps. Insert block, power b

Science

Calineuria (Cal)

Doroneuria (Dor)

Yor (Yor)

Classification Results:

Classified	as Cal	as Yor
Cal	171	16
Yor	0	99

Classified	as Cal	as Dor
Cal	114	72
Dor	70	133

Surveillance: Event Recognition in Aerial Videos


Original Video Frame
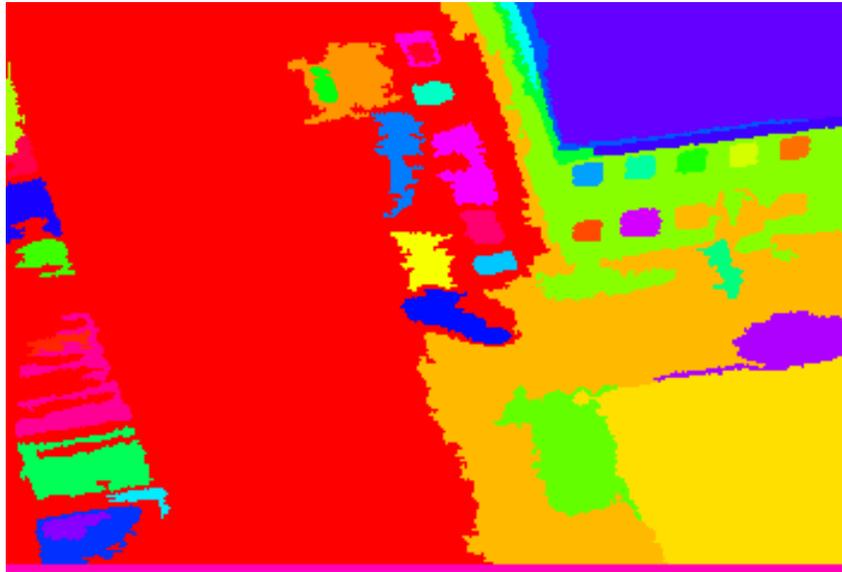
Color Regions

Structure Regions

# Face Detection (and Recognition)
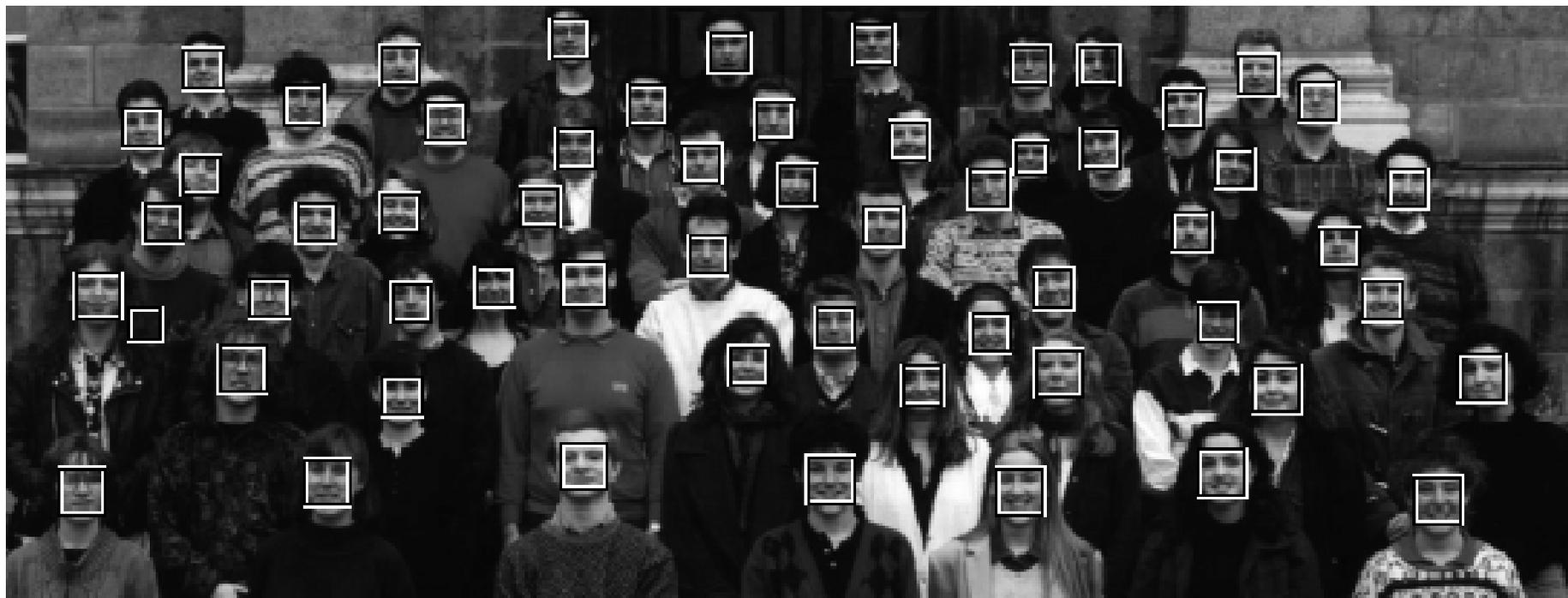
Graphics: Special Effects

Andy Serkis, Gollum, Lord of the Rings

3D Reconstruction and Graphics Viewer
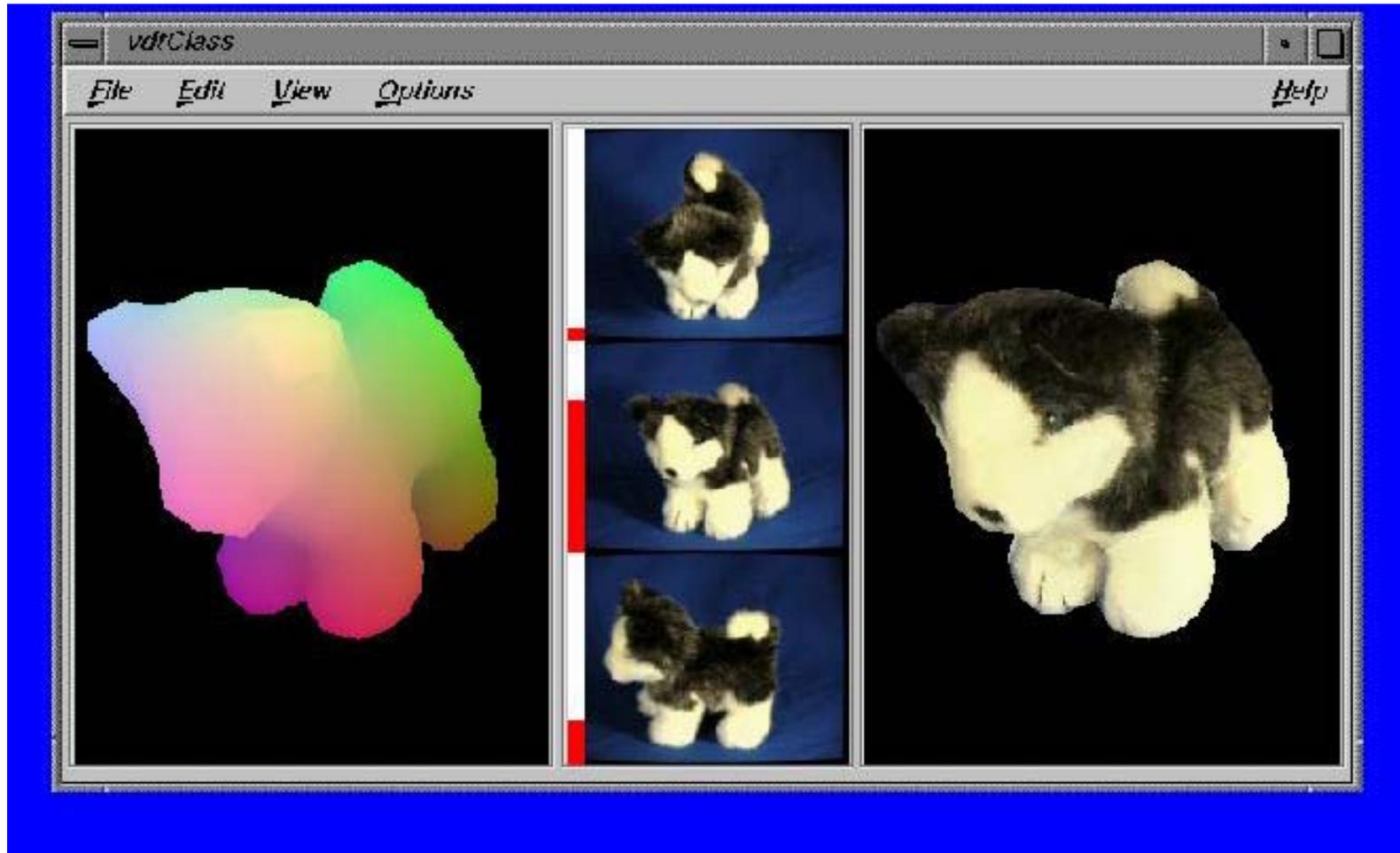
Object Recognition from "Parts"

Part 1 – Det:5e–18

Part 2 – Det:8e–22
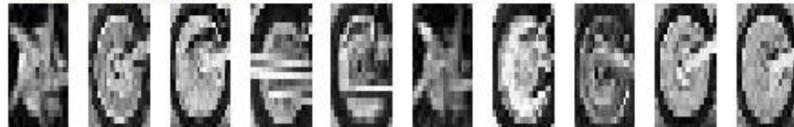
Part 3 – Det:6e–18

Part 4 – Det:1e–19
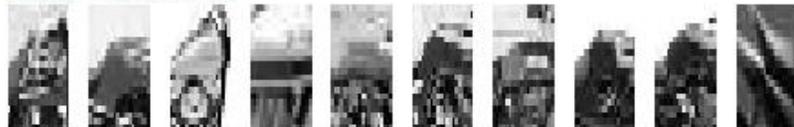
Part 5 – Det:3e–17

Part 6 – Det:4e–24

Background – Det:5e–19

Motorbike shape model