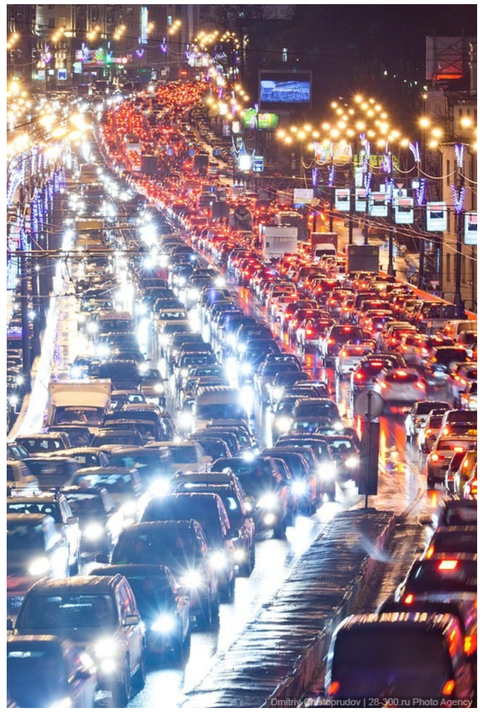
A Computer Vision Sampler

COMPSCI 527

Today:

- Introduction to computer vision
- Course logistics

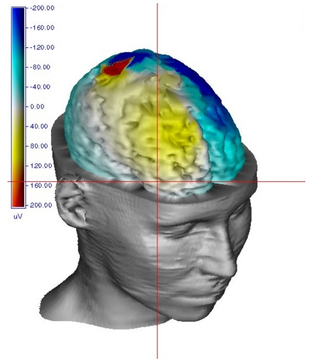

Dmitry Chistyprudov | 28-300.ru Photo Agency

iPhoto
All Faces
Allyson 3 photos
Photos
Faces
LIBRARY
Events
Photos
Faces
Places
RECENT
Summer Vacation
Last Import
Last 12 Months
Flagged
Trash
ALBUMS
Unnamed
Recovered Photos
WEB
PROJECTS
Plants Book
SLIDESHOWS
Plants Slideshow
Short Slideshow
Long Slideshow
Allyson may be in 1 additional photo
Confirm Additional Faces...
Full Screen
Search
Zoom
Slideshow
Info
Edit
Create
Add To
Share

ASIMO
HONDA

Google
self-driving car

eSSL
Security at Fingertips


200.00
160.00
120.00
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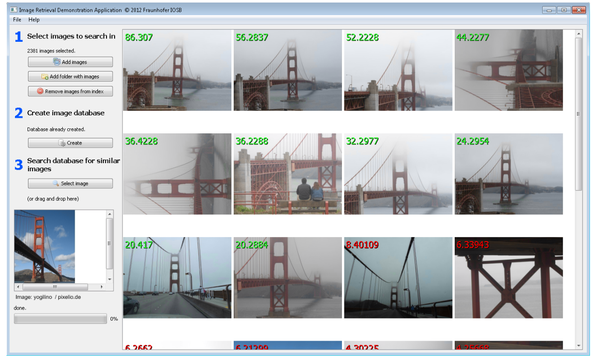
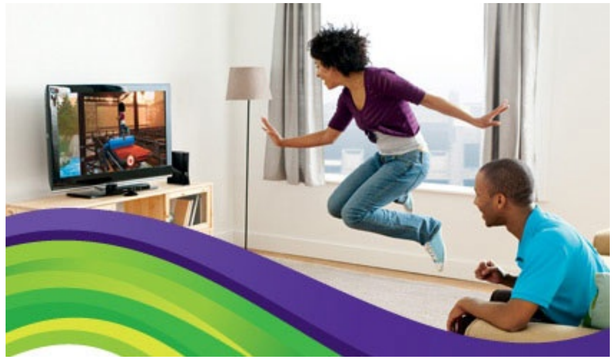


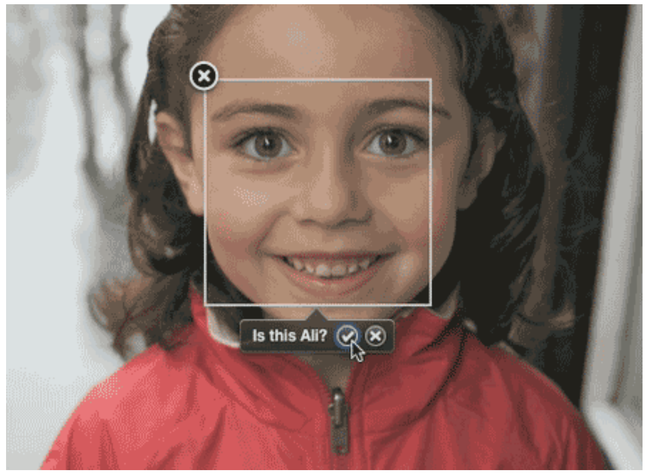
Image Retrieval Demonstration Application © 2012 Fraunhofer IOSB
File Help
1 Select images to search in
2381 images selected.
Add images
Add folder with images
Remove images from index
2 Create image database
Database already created.
Create
3 Search database for similar images
Select image
(or drag and drop here)
86.307
56.2837
52.2228
44.2277
36.4228
36.2288
32.2977
24.2954
20.417
20.2884
8.40109
6.33943

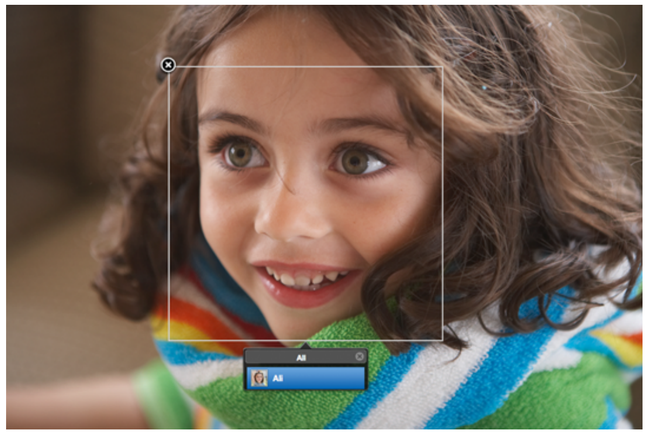


KBC
© Kristiaan D'Aout

One Image, Many Questions

Recognition and Re-Identification

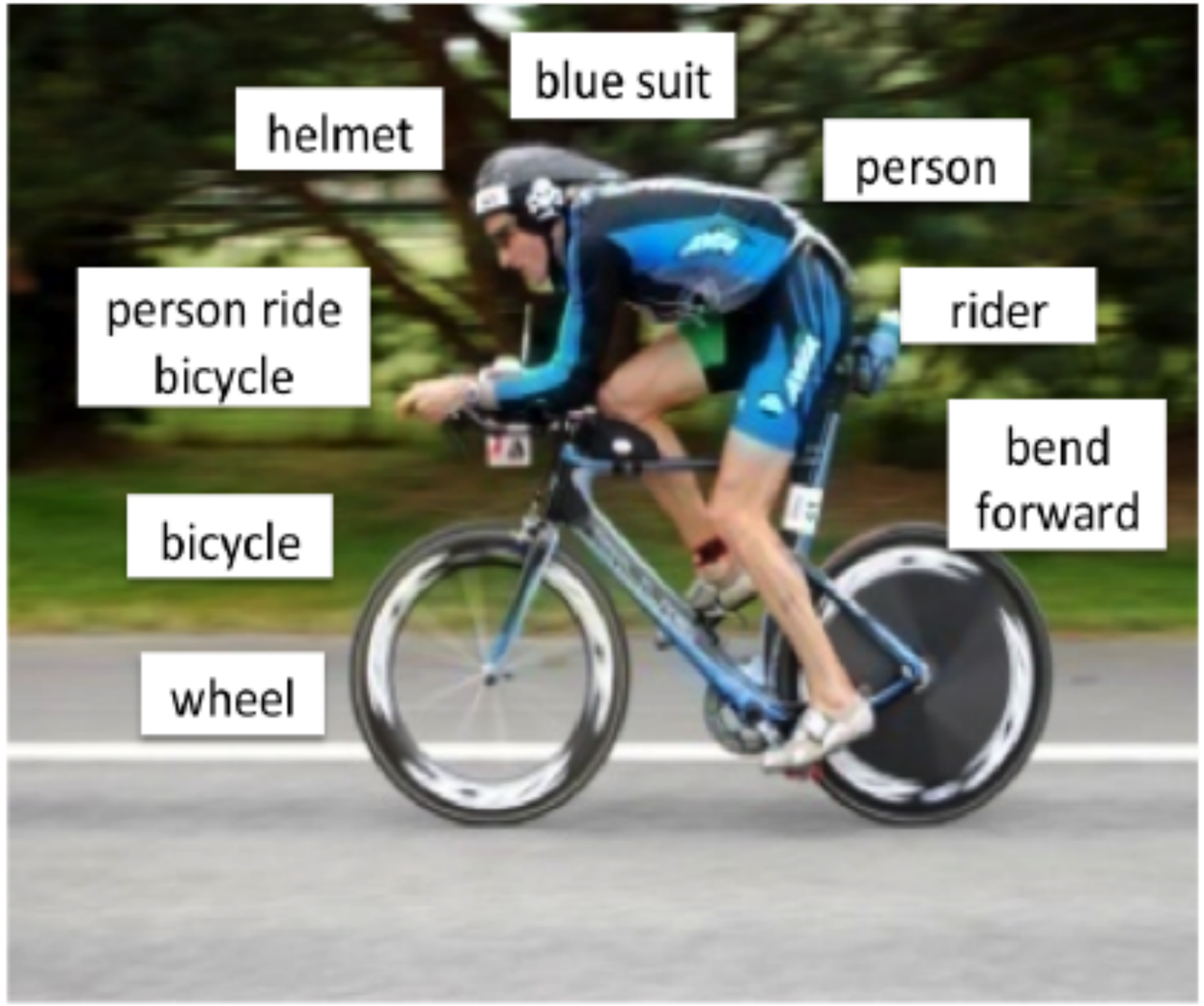




Apple Computers 2010

- Recognition: Who is this? What does this image depict (face, pedestrian crossing)?
- Re-Identification: Are these two people the same?
- Also recognize activities in video (“crossing” now becomes a verb)

What does “Recognition” Mean Anyway?

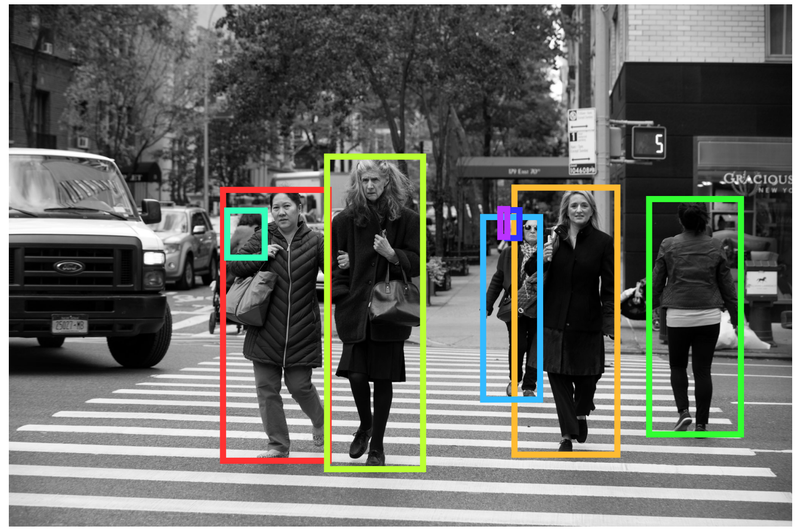


Tian Lan *et al* ICCV 2013

Detection and Segmentation

- Detection: Find instances of class x
- Class-Level Segmentation: Which pixels belong to class x?
- Instance-Level Segmentation: Which pixels belong to each instance of class x?

Detection



Class-Level Segmentation

Instance-Level Segmentation

Tracking

Across two or more video frames

Benfold and Reid CVPR 2011

3D Reconstruction

From two or more images

Sameer Agarwal et al CACM 2011

Appearance is Tricky

Appearance is Tricky

[slide idea by Fei-Fei Li]

Images are Cluttered

Logistics

Academic Integrity

- *Short version: Cheating will be prosecuted*
- Cheating: Using someone else's material or help in your work without giving credit [Lone exception: class materials need not be cited]
- Ditto for making materials available to others
- Giver/receiver are treated the same
- Format for using/making available is immaterial
- Only communication allowed during homework is with your group peers, if any, and with the teaching staff

Videos and Notes

- Prerecorded videos on the Syllabus page are compact versions of the lectures. They are *not* required
- In-person lectures will be recorded on Panopto (access from Sakai)
- ***Notes on the class Syllabus web page are required reading, and are your main source of information along with homework and sample solutions***
- ***Slides are lecture props, NOT study materials***
- ***All appendices in the notes are optional reading***
- Feel free to integrate with other sources. See *Resources* web page

Homework

- Homework 0 is on prerequisites and is due before the add/drop deadline
- ~5 assignments after homework 0
- Some math, some text, some programming
- OK to work in groups of one, two, three [but no division of labor!]
- Jupyter notebooks → HTML → PDF
- Two submissions on Gradescope: PDF, Notebook
- **One pair of submissions per group, remember to list all names!**
- **No late homework accepted** (would be unfair to your peers)
- Worst homework score (including 0 for no homework) is dropped

Exams and Grades

- Exams:
  - One midterm on March 9, in person (just before spring break)
  - One final on May 5, 2-4 PM, in person, not cumulative (two hours, not three)
  - Closed book, closed notes
- Grades:
  - Homework: 50% (lowest homework score dropped)
  - Exams: 47% (0.7 max(Midterm, Final) + 0.3 min(Midterm, Final))
  - Class attendance: 2%
  - Class evaluation: 1%

Attendance

- Two points out of 100 are for attendance
- Download the app at https://arkaive.com
- Enroll with code KBB2
- Check in within 30 minutes and up to 10 minutes early
  - $\geq$ 20 credits: 2 points
  - 10 $\leq$ credits $\leq$ 19: 1 point
  - $<$ 10 credits: 0 points
- I update credits on Sakai about once a month

Programming

- All programming will be in **Python 3**
- If you know how to program, picking up Python takes a few hours and Google while you program
- If you don’t know how to program, this class may not be for you
- You will write **Jupyter Notebooks** for homework. They are easy to get used to, and let you intersperse text, math, figures, and code
- A first homework assignment will help you ease into these tools
- The **Anaconda** distribution for everything you need is very strongly recommended
- **Program and debug in PyCharm (see resources), not Jupyter!**
- See the *Resources* web page for tutorials on Python 3, Jupyter, Anaconda
- Specific instructions also given in homework 0

Teaching Staff

- *Graduate TAs*: Yuqi Wang, Jonathan Donnelly
- *Undergraduate TAs*: Aakash Kothapally, Aining Liu, Aqib Mahfuz, Frank Willard, Louis Hu, Matthew Giglio, Nicholas Talati
- If you like this course, please volunteer to TA next year!
- Each of us will have office hours each week, either in person or on Zoom
- **Check the online calendar before attending office hours**
- We'll keep listening to Ed STEM (at reasonable hours)
- **Talk to us!** We are here to help you learn